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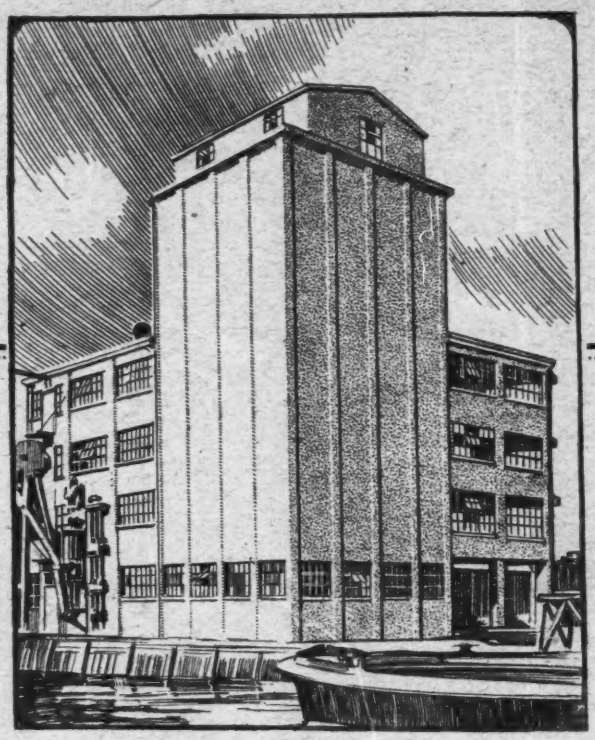

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The editor will be glad to consider contributions from those engaged in the Food Industry. Articles intended for publication should be of a practical nature and accompanied by photographs or drawings whenever possible.

August, 1928


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### Sir Edgar Jones.

WE HAVE already commented upon the Second Annual Convention of the National Food Canning Council opened at Worcester on May 23; so important—one might even say, vital—have these two institutions of Convention and Council become in their relation to the present and future prosperity of our canning industry, as yet barely out of the nursery, that no further explanation by way of an apology for reversion to the subject should be required.

Behind these two institutions, supplying them with inspiration and vitality, is that dominating personality, Sir Edgar Jones, and when the history of the renaissance of English canning comes to be written, his name will stand out on every page of the opening chapters. He is the pioneer of untiring energy, steadfast courage, and vigorous optimism, and certain it is that the many difficulties which beset the path of the industry in its youth will be swept aside by one who does not know the meaning of the word "defeat."

The canning industry in this country is growing—and growing rapidly. We are moving fast; but we have far to go: Sir Edgar Jones spurs us on—says we are not moving fast enough. He holds out the promise of great things; soon we shall have a production and turnover of distribution sufficient to justify a large export trade for the people all over the world who are hungering for our delicious English fruits. There is immense room for expansion, and we have the organisation and enterprise to do it. We have, too, a combination of powerful interests, the good wishes of everyone, and the support of the Press.

Is there anything more for which a young, healthy offspring of the great food industry could wish?

### Campden.

We have asked a question, and we do not conceal our earnest hope that it will draw from readers some helpful replies; they cannot fail to be helpful, because the more light that is thrown upon the path ahead, the faster will be the progress.

Sir Edgar Jones, himself, has pointed to one source of weakness which will have to be put right with the least possible delay. We are hampered by a shortage of men with an adequate technical knowledge of canning processes and machinery. In one sense, this is unfortunate; in another, it is good news. Here is an opening for young men with engineering and processing ability; there is an open field with good prospects. But these men have to be trained, and the training required is highly specialised. One naturally turns to the Campden Research Station, only to learn that this requires additional equipment and educational facilities before it may be said to be in a position to provide the technical training necessary to those engaged in large scale production in the modern canning factory.

The more one considers the full significance of a

cramped and inadequate training ground for recruits into the canning industry, the more obvious becomes the responsibility which rests upon the shoulders of that industry. What is going to be done?

### The Exhibition.

From almost every point of view, it might be said, the Confectionery and Chocolate Exhibition held at Olympia during the second week in July was a success. Representing such a variety and multitude of interests, it would, indeed, be surprising if everyone concerned with the Exhibition had found no reason to be other than perfectly satisfied; speaking for ourselves, we were conscious of the absence of a bakery section, and we also noted with some surprise the deficiency in machinery which plays so important a part in the manufacture of confectionery. Doubtless this was due to the restricted space available; as a matter of fact, this did apply to at least one important firm.

Given sufficient space available for bakehouse exhibits, the conditions were ideal. The roof of the hall is glass, and there was a relentless sun on the other side of it; these contributed to the production of a temperature which would have made the baker feel at home, and would have imbued him with a marked sense of superiority over those of us who are not accustomed to artificial tropics.

There were, altogether, some 170 stands, most of which were devoted to the sale of chocolate, candy, and other confections; but there were stands devoted to essences and flavourings, bottles and other containers, and machinery.

### Jam Labelling.

The Conservative Parliamentary Agricultural Committee decided on July 17 to make representations to the Minister of Health, urging him to take steps to ensure that jams containing preservatives other than sugar or sweetening matter should be clearly labelled to that effect.

This is all to the good; but why stop at preservatives? Is there any reason why the Committee should not "go the whole hog" and follow the suggestions we made in these columns only a few weeks ago?

### Meat Canning.

Investigation by the New Zealand Department of Scientific and Industrial Research of a process involving the use of sodium nitrate has produced what is claimed to be an entirely new method of canning meat, and the Health Department has published regulations permitting the use of the new method. This process is said to be more rapid and more efficient than the saltpetre method. Moreover, it enables the beef extract, which hitherto was useless on account of its high salinity, to be utilised in the preparation of nutritious food for pigs and poultry, and the meat itself, when canned, possesses an even standard of quality and colour. It is estimated that the adoption of this process would result in a yearly saving to the meat industry of the Dominion amounting to about £40,000.

### Nitrates and Tin Cans.

The above reminds one of some interesting experiments that have recently been carried out by the United States Department of Agriculture (Office of Horticulture, Bureau of Plant Industry) on the effect of nitrates upon the corrosion of tin cans, which suggest that the corrosion caused by pumpkin is partly due to nitrates.

The experimenters, C. W. Culpepper and H. H. Moon, have, for the past few years, made tests upon cans in connection with the corrosion effected by certain fruits and vegetables. It has been often suspected that substances other than acids sometimes play a greater part in the corrosive process than the acid itself; oxygen, anthocyan pigments, amines and sulphur compounds have been given consideration by several workers. Since nitrates are known to occur in many plant tissues, especially in underground parts, it seemed worth while to determine the part played by nitrates in corrosion.

It was found that when solutions of nitrates in tin cans are heated as in ordinary canning operations the effect upon the corrosion of the can is often tremendous. The effect rapidly increases with increase of acidity. The tin is attacked first; the iron is not greatly attacked until practically all the tin is removed.

### Metals and Milk.

An important paper on the influence of various metals on milk was contributed by Q. F. Hunziker, of the Blue Valley Creamery Co., Chicago, at the recent International Dairy Conference in London. After a comprehensive review of the earlier work on the subject, and summarising the conclusions of the Reports of 1923, an account of present investigations was given. The work consisted of a study of the effect of sweet and sour milk and cream, or organic and mineral acids, and of such other media to which dairy equipment may be exposed, such as washing powders, chemical sterilisers, and refrigerating brines, on various metals, coated metals and alloys now available and mechanically suited for use in dairy equipment. The method employed was to immerse metal strips, either totally or partly, in the liquids, and every effort was made to simulate, as nearly as possible, the treatment and use which the equipment receives in commercial milk plant operation, such as providing wide ranges of temperature

and periods of exposure. The metal strips were cleaned, vacuum dried, and weighed. The colour, character, and flavour of each liquid for each strip, and the visible extent and character of corrosion of each strip, were noted at the conclusion of each test. In all, nineteen different metals were investigated, and after careful consideration of the general observations of the effects of temperature, acids, alkalis, calcium or sodium brines, successive steam heating and brine cooling, the author classified the metals in order of suitability as follows:

1. Superascoloy (chromium nickel steel 17-20 per cent. Cr., 7-10 per cent. Ni.), tin, nickel.
2. Heavily tinned copper, aluminium, aluminium-manganese alloy, enduro (chromium steel 16·5-18·5 per cent. Cr.), ascoloy (chromium steel).
3. Monel metal and nickel silver.
4. Tinned iron, copper, galvanised iron, iron, zinc.

The discussions of the various influences of the different metals tried are comprehensive, and should prove of great value to all those interested in the handling and storage of milk and milk products.

## Meat Treatment.

It is thought that there may be a commercial application of the fact that the flesh of chickens, rabbits, pigeons, etc., can be flavoured as required by injecting suitable substances directly into the blood stream; the muscles readily take up the aroma.

Investigations, carried out in Germany, into the keeping qualities of frozen meat, especially frozen sausage meat, and employing appearance, smell, and bacteria ratio as criteria, show that there was no fundamental difference in deterioration between frozen and native meat after storage at 4°, 20°, and 37° in raw and in cooked states. No difference was observed between first-quality native sausage meat and 10-16 months old frozen meat after storage at an average temperature of 15° and an average humidity of 60 per cent., with systematic control of character, oxygen consumption, methylene-blue reduction, and acidity and rancidity of the fat.

## Fruit Storage.

A site has been chosen at East Malling, Kent, close to the Horticultural Research Station, for the erection of a fruit storage research station. Towards the cost of this, the Empire Marketing Board has made a grant to the Department of Scientific and Industrial Research, and the work is to be associated with that in progress at the Low Temperature Research Station at Cambridge. One of the subjects to be investigated is the effect of the previous history of fruit upon its quality and physiological condition; another will concern itself with the commercial methods of regulating the conditions in stores containing fruit and other products in bulk.

## Citron.

A reader has asked for an explanation of the hard inner parts of certain samples of preserved citron. It is almost impossible to give a definite and final answer, with no data available, beyond a small sample. Our laboratory is always available for the carrying out of investigations in any branch of the foodstuff industry, but it is a considerable help, and in some cases absolutely essential, to give details of the processes employed, otherwise the investigator is faced with a whole array of possible causes of the effects which are required to be modified or removed.

Little has been published, and probably little work of a scientific and technical nature has been done, on the curing and preserving of citron. This interesting fruit was the first of the citrus fruits to be introduced into the Mediterranean region from the Orient, and was cultivated there for centuries before the orange and the lemon were known in that region.

Sometimes it is propagated from cuttings, but it is generally budded on other stocks, such as the sweet orange, sour orange, or rough lemon. Considerable judgment is required in selecting the fruit intended for preserving. It should be picked when full grown, yet still green. A certain oiliness of the surface is one indication of proper condition, and the oil sacs should be well developed. The texture of the surface and the density of the fruit afford other criteria.

## Citron Curing.

In curing, the dense, opaque tissues swell and become translucent; the rind should be firm and tender, with the bitter flavour removed and the agreeable citron flavour retained. In Corsica the fruit, cut into halves, is placed in casks of sea water (which contains 3·7 to 4 per cent. of salt), and it remains immersed for about forty days, the water being changed on the fifteenth day. During this time, fermentation is active and $CO_2$ is evolved. The fermentation is stopped by the addition of salt. French investigators have found that a certain yeast and a bacillus were the active and essential agents in the curing of the citrons. It is obvious that the curing process can be brought under proper control only when full knowledge has been acquired of the parts played in curing by each and every factor concerned, such as composition of the brine—chemical and bacteriological—temperature, and time of curing. Temperature is particularly important; probably, as in the case of sourkrout, it controls the rate and kind of fermentation, and thus has a marked effect on the quality of the product.

### Fruits in Ice-cream.

Investigations on the use of fruits in ice-cream, water ices, etc., have been conducted during the past three years by the Dairy Industry Division and the Fruit Products Laboratory, U.S.A. The following summarises some of the more important results:

Most manufacturers use too small a proportion of fruit in fruit ice-cream and ices.

A basic ice-cream mix containing about 40-41 per cent. solids gave better results with fruits than did a mix of about 35 per cent. solids; the texture was smoother and the flavour richer.

Canned figs, in particular, gave an excellent ice-cream which has proved popular when placed on the market. Prunes gave the best results of all dried fruit studied, and because of their health value, this should have great commercial possibilities. Raisin ice-cream made with Muscat raisins was excellent.

Broken pieces and ground or chopped candied fruits, by-products of candied fruit factories, were found very satisfactory for use in specialities, such as tutti frutti ice-cream.

Preserves and jams were not satisfactory because they were too sweet and too costly; their high sugar content reduced the freezing point and caused the ice-cream to be soft.

### Sourkrout.

The work carried out on the relation of temperature to rate and type of fermentation and quality of sourkrout by the Wisconsin Agricultural Experiment Station is instructive in that, apart from its interest to sourkrout makers, it provides an example of the kind of technical work which must be done on a very extensive scale if we are to gain anything like a clear insight into the mechanism of curing, and, in consequence, to be able to exert some measure of definite control over its vagaries.

Sourkrout packers seldom attempt to control the initial temperature of the shredded cabbage, with the result that the temperature of the different vats varies widely during the packing season. This initial temperature of the cabbage largely controls the temperature of fermentation, and the temperature of fermentation largely controls the rate of lactic acid production.

As a side issue, it may be usefully mentioned that, according to the experience of the Wisconsin experimenters in this particular instance, titratable acidity is a much better measure of the degree of fermentation than are Ph determinations.

The best sourkrout was obtained from the vats at intermediate temperatures; at higher temperatures the product was more or less pink and of poor quality. Presumably the fermentation at these temperatures went on too rapidly, affording conditions favourable to the growth of pink yeasts.

### Film Yeasts.

Whilst on this subject, we might recall two other recent investigations which have enlarged our knowledge of pickle technology. One is by Professor Cruess and concerns the characteristics of micro-organisms occurring in brines, and is a study of "film yeast" formations on brines, krout, and vinegar stock. Aerobic film-forming micro-organisms of yeast-like appearance occur very commonly on brines used in the storage of olives and vegetables, such as cucumbers. It was found that this film yeast rapidly destroyed lactic acid when the air supply was adequate. Sealing the containers or covering the brine with neutral oil checked the growth and practically prevented all loss of acidity during a storage period of eighty days. The same applies to direct sunlight.

Eighteen per cent. salt prevented the growth of most of the micro-organisms used in the experiments, although one mixed culture from cucumbers grew perceptibly on brine of this concentration. Growth was visible, and destruction of acid was noticeable on most brine cultures containing 16 per cent. salt.

### Dill Pickles.

The other research, due to Professor Cruess and B. E. Lesley, was concerned with the effect of acidity on the softening of dill pickles. Sometimes a certain proportion of the pickles turned out in the factory become somewhat slippery on the surface and also soft before they are normally placed on the market. Various amounts of distilled vinegar were added to the brines at the time of filling the casks. The brines having the highest initial acidity developed the highest final acidity. The dill pickles in the very acid brines were much softer at the end of fermentation than were those in the brines of low acidity; also, the former softened rapidly on storage, whilst the latter remained firm or showed only a small proportion of soft pickles. These findings were checked by hydrogen ion determinations; also, fermentation in the presence of a buffer which prevented the normal rise of hydrogen ion concentration gave very firm pickles, and no soft pickles were formed in laboratory tests on the anaerobic fermentation of cucumbers, in which the ratio of brine to cucumbers was considerably larger than in practice. A theory was formulated that acid hydrolysis of the tissues is responsible for the softening.

### Malic Acid.

Malic acid has been approved by the U.S. Department of Agriculture for use in food products, and is being manufactured in large quantities in competition with citric and tartaric acids for this purpose.

# The Manufacture of Pickles

By CHARLES E. SEARLE

*In a recent issue of* FOOD MANUFACTURE, *an article appeared from the German giving one aspect of this important and interesting subject. The author offers the following brief remarks on a subject which covers a very wide field, hoping that they will call forth criticism and further information. We suffer, in this country, from a rather narrow-minded secrecy, and our ideas, knowledge, and methods spread slowly as an employé moves from one firm to another. It seems quite possible that the excellent products turned out in America owe much to a less impeded and more rapid circulation of knowledge there.*

THERE ARE two distinct sides to the question of pickle making—really two distinct industries—and a knowledge of one is not absolutely essential to a knowledge of the other, beyond the general fact that "all knowledge" is valuable. I refer to the industry known as the "Brining Industry" and to that known as "Pickle Manufacture."

## The Brining Industry

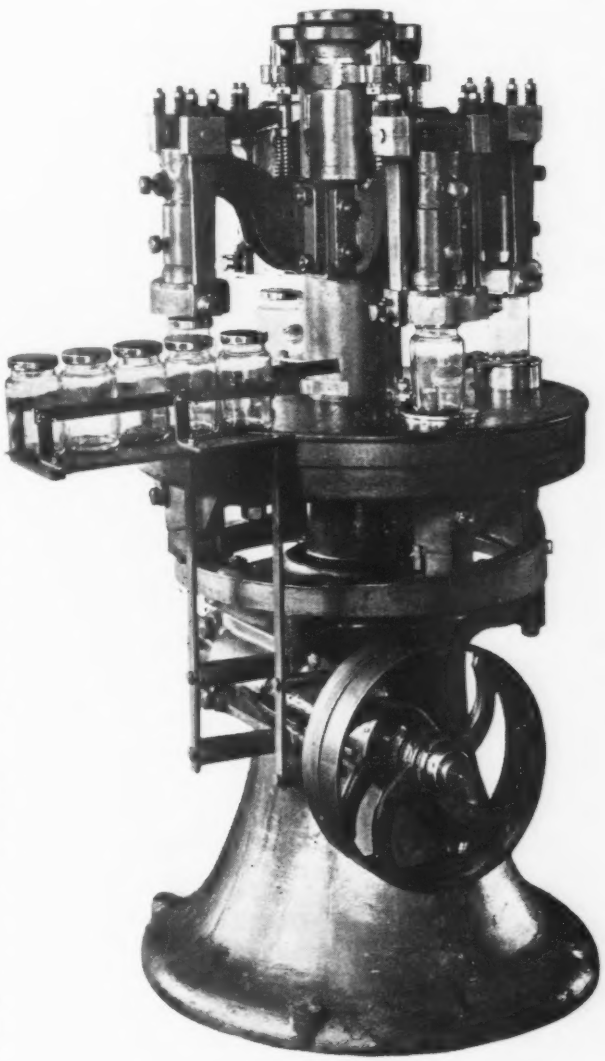
To deal briefly with the first of these. Pickles in this country are chiefly composed of onions, cauliflowers, cucumbers, gherkins, and either malt or acetic acid vinegar, but in America, beans, citron, corn, pumpkins, sauerkraut, dill pickles, and possibly other varieties are met with. Some of these, however, are found in English pickles, chiefly in the minced form, and in America, particularly, sweet pickles are in evidence. Much has been written on the subject of brining of vegetables, and though a sound practical knowledge leads to success, I should hesitate to advise anyone to undertake the business without first obtaining the services of a practical man with a good knowledge of his subject.

Large quantities of the necessary vegetables are brined in Holland—quantities come from France and Italy—and can be obtained either direct or through one of the English agents. Not only are there large farms in the Netherlands devoted to this business, but a considerable number of small market gardens, some being only two or three acres in size. There are many varieties of onions which are known under different grades and names, such as stripy, pearl, etc. The pearl onion is the much prized, little white onion, which is usually packed in vinegar by itself; then there are Nos. 1, 2, and 3, etc., with variation 1*a*, etc. It must not be assumed, however, that No. 1 from different buyers, or in different seasons, is always the same, and it is best to buy on sample, and then, when satisfied, to buy as large a quantity as can be conveniently carried, spreading, if necessary, the delivery over several months.

Onions grow best in a clayey soil, which always retains a certain amount of moisture; after they have been pulled and dried, they are sold raw and unpeeled to the agents of the brining factories.

One has only to employ untrained English girls to peel the onions to learn that this alone constitutes one of the ways in which the process can be unprofitable, since the process is one requiring no ordinary skill, if it is to be remunerative. The brining factories have specially constructed riddles or sieves, arranged one over the other, to sort out the various sizes after they have been peeled ready for brining.

The onions are then placed in casks or hogsheads and a 10 per cent. salt solution is poured over them to fill the cask; occasionally more salt is added, and



**Automatic Capping Machine.**
*(Courtesy of Sutax, Ltd.)*

the solution should not fall below 8 per cent. During the fermentation process, the casks are stood on end, and occasionally the liquid is partially drawn off at the bottom and added to the top, either by hand or mechanical means. The process of fermentation takes about four or five weeks; softening of the onions is usually due to weakness of brine, which should never fall below 8 per cent.

Sometimes, however, onions are stored in changes of water for three or four days and then treated with a brine solution strong enough to prevent fermentation, say 15 per cent., but it is generally understood that the weaker the brine is, the better the texture of the finished product will be.

Sometimes a little vinegar is added, and after fermentation the liquor should be slightly acid, as indicated by litmus paper. The casks are then sealed down tightly, and, except for sampling, are not opened until they arrive at the pickle factory. Success depends a great deal upon the quickness of fermentation and covering.

Many of the facts relating to onions apply also to gherkins and cauliflowers.

Gherkins are known in many grades, such as fine gherkins, gherkins, bastards, chumps, etc., and are sold usually under numbers, such as 8/12, 90/100, 160/180 to the kilo, in amounts of 100 kilos; there are usually about 660 lbs. to 600 lbs. in a hogshead. The quantity of salt used depends upon the sizes of the gherkins and the country to which the goods are exported.

There are, of course, other varieties of pickles—namely, walnuts, olives, red cabbage, and beetroot, etc., which, when space permits, will be discussed in a later issue.

We will now consider the production of the actual pickles on their arrival in the factories in England.

## Pickle Manufacture

There are many wonderful machines on the market, but there is still much scope for the inventor, and as this paper has such a wide circulation, it may serve a useful purpose to suggest one or two possibilities to readers. To say that these machines have not been invented is perhaps saying too much; nevertheless, the writer has looked for them in the course of the last twenty-five years, but has failed to find any. One is a machine which will pack pickles efficiently and neatly into glasses. One of the reasons for the comparatively high price of well-packed pickles is the labour involved in the process, for it takes an average girl at least six months to learn the necessary operations quickly, and in times of rush, when extra girls are employed, the latter can turn out only about half the output of an experienced girl.

When the pickles arrive at the factory and it is desired to use them, they are first soaked for a short time in warm water, in order to remove the excess of salt. They are then sorted over; the cauliflowers are cut into small pieces, putting on one side any hard stalks; loose onion skins are removed, and the pickles are then placed in a solution of acetic acid until they are required for packing.

In the case of cauliflowers, turmeric is added to give them their yellow colour; the gherkins being first cut into suitable sizes.

It is desirable not to mix the pickles at this stage, but to keep each sort in a separate cask, or enamelled iron or glass container.

By the courtesy of the makers we are able to show various machines, the uses of which will be explained as we deal with the process; bottle washing and labelling machines need no introduction.

When ready to pack, the vegetables are placed on sieves and carefully drained, and then, in the case of mixed pickle, are placed neatly in the bottle with a special scissor-like tool in a prearranged design. It is, of course, far simpler when filling bottles with onions, cauliflowers, or gherkins only. The bottles are then placed under a conveniently situated tap and filled with water, and, after a time, stood on a specially designed table to drain. Except in the case of onions, they are best left to drain all night. I have always found that this rinsing and draining renders the vegetables much brighter and cleaner than if the vinegar is placed directly on the vegetables. The design of the special table is somewhat difficult to explain; it has a raised, wooden border of four or five inches, and is sloping, so that one end is slightly lower than the other; grooves are cut in the table to allow the draining water to run easily away, and sticks of wood are placed cross-wise to prevent the bottles from slipping. In the morning the bottles are stood up and vinegar is poured in them, and specially prepared paperings and metal tops are placed in position before passing them to the sealing machine.

Great care must be taken in selecting the vinegar, since the quality of the vinegar plays an important

**Filling Machine.**
*(Courtesy of Albro Fillers and Engineering Co., Ltd.)*

**Automatic Bottle Washing Machine.**
*(Courtesy of W. Webster and Co., Ltd.)*

part in the process. In Scotland, white distilled malt vinegar is usually used, but in England the brown malt is mostly used. Several firms specialise in the manufacture of vinegar for this purpose. Personally, I prefer a 5 per cent. vinegar (No. 20), but if a weaker vinegar be used the difference is made up with acetic acid.

Black pepper, allspice, and red chillies are included in every bottle of pickle for seasoning.

In dealing with such pickles as chow-chow, piccalilli, etc., the sauce is usually made separately and poured over the cut vegetables.

It is interesting to note that the making of piccalilli, chow chow, and the various minced pickles had their origin in an attempt to use up parts of vegetables which, though quite good, were unsuitable for packing, on account of their appearance in the familiar mixed pickle; but the demand for them soon exceeded the supply of odd onion skins, pieces of gherkin, etc., and there is now probably a greater sale for the minced pickle than for the ordinary mixed variety.

With regard to the minced or sweet pickle, by the courtesy of the Albro Filling Company we are illustrating one of their fillers; the pickles with their sauce are placed in a container which is kept slowly moving so as to maintain uniformity; from this container a tube is connected to the "Albro" filling machine; the bottles are then placed in position, and a vacuum is created in the bottles, and as a result the pickles are drawn up to a prearranged height, the vacuum breaking and the flow of pickles automatically ceasing.

Another remarkable feature about this machine is the almost intelligent way in which it sorts out cracked bottles and refuses to fill them, as it is, of course, impossible to obtain a vacuum in such glasses.

One of the varieties of pickles for which there is a great demand in Scotland, but which receives very little attention in England, is beetroot. If a manufacturer is approached on this matter he invariably replies that everybody pickles their own, but the same was said of jam, coffee essence, etc., yet no one will deny that these articles find a definite place in household economy.

Beetroot and red cabbage are probably the two most difficult propositions in the pickle industry, because of their liability to ferment; this difficulty can, however, be largely overcome by the process of sterilisation, but great care has to be exercised in the purchase of the beet.

While some kinds of turnip beet are quite satisfactory, the writer has had most satisfaction from the Dunbar red soil beetroot.

One of the interesting machines we are showing here is the Sutax Capping Machine, which by one simple movement closes the lid and makes a satisfactory airtight joint.

An interesting process for the quick manufacture of pickles is in use in some factories; the vegetables being placed in a vacuum vessel and the air sucked out from the cells, and spiced vinegar forced in to take the place of the air. While this process is a great saving of time, the question of the necessary plant needs consideration.

In conclusion, the writer is intentionally leaving an opening for someone with a knowledge of the English brining and growing business to contribute an article on this side of the question, one who is perhaps better acquainted with the subject than he himself is.

# Some Notes on Modern Methods of Producing Cod Liver Oil

By E. F. HARRIS

DURING RECENT years, cod liver oil has come to be recognised as a *food* more than a medicine, and since it is very rich in the "fat soluble vitamin A" (sometimes called the "condensed sunshine vitamin"), its uses are being appreciated to a constantly increasing extent. Young children suffering from rachitic troubles (rickets) and lack of sunshine generally are taking it; farmers and stockbreeders, dog and poultry fanciers, are giving it to all kinds of domestic animals as part of their daily food—horses are given 4 ozs., cows 2 ozs., pigs 1 oz., dogs ½ oz., and so on. Hence, the demand is much greater than formerly, and is still increasing, both for human consumption and for veterinary purposes.

In the manufacture of cod liver oil, the livers are taken from the fish immediately they are caught, and either stored in ice till landed, or treated at once. The livers are then "boiled" in order to separate the oil from the tissues, proteins, and other solid matters which form the cells containing the oil and bind them to the semi-solid mass known as the liver. As may be readily imagined, it is of great importance that, throughout the whole process of the production of cod liver oil, it should be kept as "fresh" as possible, and the oleic acid content should be as low as possible. Various methods to obtain this ideal have been adopted—particularly by the Germans—including the installation of boilers and refineries on board the trawlers. But, in any case, a certain amount of water and solid matter is invariably left in the oil in the early stages of extraction, and the general practice has been to remove these by "gravity settling." The presence of these solids and moisture tends to cause an increase in acidity, and if the acidity exceeds a certain degree, both the food value and the market value of the oil are decreased. Formerly, it was necessary to leave the oil taken from the boilers in settling tanks for periods up to three weeks, in order that the foreign matter might fall out of suspension. But during this settling period the oil gradually became more acid, or "staler," and its food and money value decreased.

Since the introduction of the "De Laval" into this field, it is possible to do away with the settling tanks entirely, and the oil, whilst hot, is now passed straight from the boilers through a "De Laval" purifier, and is thereby immediately freed from all solid matter, and dehydrated to an extent which no amount of settling would ever accomplish. Its acid content is thus kept down to a minimum, and the oil is much "fresher", than would be the case had it stood in tanks for two or three weeks, in contact with the deleterious substances which increase acidity. Also, since "De Laval" purification is complete, the condition of the oil is more stable than it would be by settling, and in this state it is practically ready for sale as "veterinary cod liver oil," though further purification is required to remove some of the taste and colour in oil for human consumption.

**Battery of Purifiers for Fish Oils.**
*(Courtesy of Alfa-Laval Co. Ltd.)*

A further use for the "De Laval" in oils of this type is the employment of it in conjunction with a low-speed centrifuge, such as that manufactured by Thomas Broadbent and Sons, of Huddersfield. About 15 per cent. more oil may be extracted from the livers by this process, and the resultant solid matter, being much drier, has a market value as guano.

Veterinary cod liver oils are produced and marketed by Messrs. Bicol, Limited, of Grimsby, who issue literature dealing with the feeding of all kinds of live stock on this valuable food.

## U.S.A. Pig Crop

"A DECREASE of about 7 per cent. in the spring pig crop of 1928 from that of 1927 for the United States as a whole and also for the corn belt states is shown by the June pig survey of the Department of Agriculture. This decrease is equivalent to about 4,000,000 head of pigs for the United States, of which over 3,000,000 represents the decrease for the corn belt states. A decrease in the fall pig crop of this year from that of last year is also indicated. The survey was made in co-operation with the Post Office Department through the rural mail carriers. . . .

"Assuming the average spread of past years between June breeding intentions and December farrowings, the decrease in fall farrowings this year would be 15 per cent. for the U.S. and 9 per cent. for the corn belt; assuming the smallest spread, the decrease would be 7 per cent. for the U.S. and 3 per cent. for the corn belt."—*U.S. Department of Agriculture.*

# Twice-made or Pasteurised Cheese

By L. J. LORD

THE MANUFACTURE of this rindless or crustless cheese seems to have originated as far back as 1910, when the Swiss makers of Gruyère sought a means of imparting, by pasteurisation, keeping properties to their cheese for export abroad; more particularly to tropical countries, for which the average type of hard cheese is not well suited. In fact, it is highly probable that few travellers in the tropics in those days saw any imported cheese in the shops, other than "potted" cheese, except the globular Dutch, or Edam, which by reason of their firm, but elastic texture, were formerly best suited to, or rather, less adversely affected by, the warm surroundings than any other type of cheese in its ordinary form.

The Swiss cheese—normally a very large, flat, round cheese weighing from 50 lbs. up to as much as 250 lbs.—took a new form, being marketed as a comparatively tiny cheese packed in a chip box, such as is used for the Camembert and similar types of French cheese. Later on, this developed into the sectional form of six or eight in a cardboard box, a method now also applied to various other kinds.

In all of these the texture differs somewhat from that of the original cheese that forms the basis of the new type. Of the English cheeses, probably the coloured Leicester, in its best quality presenting a compact body but of "silky" rather than over-solid consistency, would suffer least from the process now under consideration; but while the original flavour is carried on to the new product, the texture may be considerably modified, so that characteristics of a particular kind, as the "eye-holes" in the Swiss varieties and the granular appearance of the English Cheshire when cut, or the same but less prominent feature in the white Wensleydale cheese, are entirely lost.

A blue-veined cheese is not suitable for the process, but it can be seen that cheeses defective in body and texture as samples of their own variety, may, with care, be transformed into loaf or sectional cheese of very good quality when treated by pasteurisation.

## The Choice of Material

Naturally, the best results are obtained if this "twice-made" cheese is manufactured from first-class ingredients; nevertheless, the process provides an outlet for goods of second quality—a judicious mixture of material can result in very satisfactory produce—and, within limits, the purchase of cheese stocks for the purpose may be effected at times when supplies are on offer at favourable prices.

Here, then, was a second good reason why the idea should be followed up as soon as a means of perfecting the new produce was settled upon. Gruyère and Emmenthaler cheese of reasonably good flavour but faulty in respect of the "eyes" not being of the desired size or type, were transformed into a cheese that lost its characteristic appearance, but in other respects was satisfactory.

The idea took root; manufacturing houses saw the importance of the new departure, and, soon after the close of the war, imports of "Kraft" cheese in 5 lb. blocks or loaves, wrapped in tinfoil and marked with cross-lines indicating where the grocer should cut the half-pound, began to come over from Canada.

The industry has reached large dimensions in the hands of firms manufacturing food products. It is not in any sense a farmer's cheese, and not a process likely to form part of the average dairyman's or cheesemaker's practical knowledge.

The ingredients are as follows:

1. A ripe or semi-ripe cheese: if the cheese to be used is not ripe enough to be full flavoured, then a small quantity of highly flavoured cheese is added for flavouring purposes.

2. A measure of "cooking salt," or prepared "sauce"—that is, a small quantity of phosphate salt used for the purpose of emulsifying the cheese fat which separates out upon heating.

3. If a coloured cheese is desired, a little cheese annatto solution.

4. A limited quantity of water.

In general, these are all the ingredients used, but there may be variations such as the substitution of citrate for phosphate, the addition of table salt when a saltless or lightly salted cheese is employed, the use of sugar for modifying or sweetening the flavour, and more or less water in preparing the mix, according to the system of cooking adopted, or the consistency desired in the finished cheese.

## Plant and Utensils

A mincing machine as used in making sausage meat is the first utensil required not usually associated with cheesemaking. All the ingredients must be intimately mixed and thereafter cooked for some little time, so from the first machine the ground-up cheese passes to the cooking pan, in which it may conveniently be mixed prior to the heating.

The best form of cooker is the semi-spherical steam-jacket pan fitted with a treacle-tap outlet underneath, and with a mechanical stirrer driven from an overhead shafting, or possibly an electric motor drive from alongside. But while such a plant is suitable for the making of these cheeses in the block form—that is, the 5 or 6 lb. bricks or loaves for cutting up by the retailer, special filling dis-

tributors and packers must be installed where this kind of cheese is packed in sections of a circular box or other small containers.

The packing plant also gets over the difficulty of lining the small moulds with tinfoil, an essential part of the work, as explained later. Hand appliances may serve very well in relation to the large boxes into which the loaves are poured, but are hopeless when concerned with much smaller containers.

### Preparation and Procedure

Clean, sound cheese is selected of whatever kind desired, except that blue-veined varieties, when ripe, are not suitable, and varieties like Camembert, which at their maturity are in a semi-liquid condition, must also be taken at an earlier stage. In the first case, the flavour of a blue cheese does not lend itself to this process and is objectionable, and in the second the flavour of Camembert can be imparted by the addition of a very small quantity of ripe cheese to the mixture before cooking.

The rind of the selected cheese is first sliced off, which may be done with little waste if smooth and not pitted with holes, crevices, or deep cracks. If any spots or fissures in the rind are mouldy, they must be cut clean out.

It is possible to use rind that is very clean and sound, but it has to be removed from the cheese and ground up separately, then soaked in some of the coloured sauce before mixing into the cooking pan. In a white cheese the rind would not mix so well, unless very thoroughly macerated and digested.

Whenever comparatively new or mild flavoured cheese forms the bulk of the ingredients, a proportion of strong, full-flavoured old cheese will provide the requisite flavour.

The cheese, after grinding, is mixed with from about 3 to 5 per cent. of phosphate, or a less quantity of citrate, the salt used being dissolved in a variable amount of hot water, sometimes as much as 10 per cent. of the total weight of ground cheese, but most of it evaporates in the cooking. Into this solution or "sauce" the colour, if any, is mixed. The amount of annatto colour used may cover a wide range, according to the tint desired. One dram of good colour will impart a pale orange tint to 25 lbs. of white cheese.

The mixture, after being thoroughly well stirred, is now ready for heating, stirring being continuous during the whole of the cooking process. The cooking is done by means of a steam-jet discharging into the jacket of the pan, while the mechanical stirrer keeps the contents of the pot moving.

At a temperature varying from 100° to 110° F., and dependable to some extent upon the character of the cheese being used, the fat will separate out as a liquid oil, while the mass is still somewhat free and semi-friable, presenting a coarse, mealy appearance. After another ten minutes or so the fat will be reabsorbed while the temperature rises until the mixture stirs freely as a smooth, easily moving batter.

Cooking now proceeds steadily for half an hour—this constitutes the pasteurising process—till the mass is in a plastic condition and flows more or less stiffly, the desired finishing stage being in relation to the requirements of the moulding arrangements or what is looked for in the finished cheese.

Where the loaf cheeses are made the preparation can be filled into the boxes direct from the cooking pan, the boxes first having been lined with tinfoil. In the course of a very short time the top surface of the newly made cheese must be covered with the margin of the foil wrapper, and when set sufficiently to bear moving, the boxes can be nailed up and removed to suitable storage.

As to the lining of the boxes, this is one of the essential points in relation to the marketing and keeping of the cheese, as by this means, coupled with the fact that the cheese is enveloped while in a hot condition, the keeping properties are more or less assured, at least in so far as regards the growth of fungus mould on the surface, which would otherwise soon become established and proceed unchecked.

It is not, for instance, possible to cast the cheese into the shape of bricks and later cut them up into smaller shapes or sizes, with a view to marketing them in a package produced at a less cost than is possible when an intricate moulding and packing machine has to be provided for in the first cost of the outfit. Unless the cutting up could be done under conditions amounting to practical sterilisation, or such a process applied afterwards without harm to the cheese or its package, the cut portions will have become contaminated with mould spores, and these would germinate and develop under the tinfoil wrapping. The tinfoil also forms, to some extent, a protection against the development of rancid and tallowy flavours which would be encouraged by exposure to warmth and light without this protection. Also it conserves the moisture in the cheese which might otherwise quickly dry out.

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# The Salmon Canning Industry

By ERNEST D. CLARK, M.A., Ph.D., DIRECTOR,

AND

RAY W. CLOUGH, M.A., Ph.D., CHEMIST,

*North-West Branch, National Canners' Association, Seattle, Washington, U.S.A.*

*The authors in the previous parts have dealt with the life-history of the salmon, the methods employed in its capture, the plant, and processes used at the Western Canneries, and the characteristics of the different species of the fish.*

## PART IV.—FOOD VALUE OF CANNED SALMON

THE FOOD value of salmon is very high, comparing very favourably with meat, whose place in the diet it is well suited to take. In fact, in many cases fish is recommended by physicians for patients with whom meat does not agree. Salmon is as digestible as the best of meats. The composition of the flesh of the five species of salmon differs somewhat. The average of many analyses is given in the table below together with the Steelhead and Atlantic salmon. These data are taken from U.S. Bureau of Fisheries Document No. 1000, entitled "Nutritive Value of Fish and Shellfish," Washington, D.C.

### Composition of Canned Salmon

| Name. | Total Solids. | Fat. | Protein (N × 6·25). | Ash (Inorganic Matter). | Food Value per Pound. |
|---|---|---|---|---|---|
| | Per Cent. | Per Cent. | Per Cent. | Per Cent. | Calories. |
| Pacific Salmon : | | | | | |
| Sockeye .. | 35·22 | 11·22 | 20·80 | 1·23 | 860 |
| Chinook .. | 36·83 | 15·72 | 17·67 | 1·21 | 991 |
| Coho .. | 32·51 | 8·49 | 21·08 | 1·24 | 750 |
| Pink .. .. | 30·20 | 6·99 | 21·40 | 0·70 | 639 |
| Chum .. | 29·96 | 6·69 | 20·67 | 1·02 | 524 |
| Pacific Steelhead Trout.. | 33·16 | 8·95 | 21·32 | 1·21 | 792 |
| Atlantic Salmon | 35·70 | 12·49 | 21·14 | 1·22 | 920 |

For certain reasons the backbone and as much as possible of the rib-bone were removed from these cans before analysing, but ordinarily they are eaten and thus increase the valuable mineral constituents in the food. The principal difference between the species is seen to be in the average fat content, which varies from 6·69 per cent. in the chum salmon to 15·72 per cent. in the chinook. From an energy standpoint the fat is very important, being capable of producing more than twice as much heat when burned in the body as the same weight of protein. Carbohydrates, from starches, sugars, and so forth, and proteins may be substituted for fats; in other words, fats are not indispensable, and neither are carbohydrates, as fats and proteins may be substituted for them. In fact, people have been known to live for long periods on very lean meat alone, consisting almost entirely of protein. However, no other class of food substances may be substituted for proteins.

### Essential Proteins Found in Salmon

The table shows also that all of the species have about the same amount of protein, and from this standpoint are of about equal value, the great range in price between the species being based largely on colour and to some extent on flavour. Data given in the U.S. Bureau of Fisheries Document No. 1000, quoted above, show that the protein content of salmon is somewhat higher than practically all of the meats and of other fish and considerably higher than cereals and vegetables. The same bulletin has the following to say of the importance of proteins in the diet:

> "Protein is one of the most important components of our diet. Fats and carbohydrates are primarily energy-yielding foods, whereas proteins are not only sources of energy but are tissue-builders as well. Our bodies form the proteins characteristic of our own tissues; they cannot build them up from simple inorganic substances but must depend upon the digestion products obtained from the food. Neither the growth of the young nor the satisfactory nutrition of adults can take place without an adequate source of proteins in the diet. Further, recent studies in nutrition have pointed out the danger of attempting to live over the entire span of adult life on a diet containing just sufficient proteins of good quality to support growth at approximately the maximum rate to the full adult size. A generous protein ingestion during our entire lives is required to maintain optimal vigour for the longest possible period."

Proteins, whether found in plants or animals, are complex compounds built up of a number of simple substances called amino acids. Certain of these amino acids are absolutely essential to the growth and well-being of the human body. Fish contain all of these essential proteins, whereas many vegetables and cereals do not. Fish are of great value, therefore, in the diet, since if we eat them frequently we shall insure the body an adequate supply of these essential substances. The proteins of fish and shellfish are superior to most vegetable proteins and equal to most meat proteins in nutritive qualities.

## Mineral Constituents of Salmon

The thousands of rivers, leaping down the rocky mountain sides, and quietly flowing through sandy desert or grassy plain, leach out the various mineral constituents from rock and soil and carry them to the sea, where they have been concentrating for millions of years. Thirty-two chemical elements have been detected in sea-water, many of which seem to be essential to the well-being of man; and perhaps it is not strange that they are essential since evolutionists have apparently traced all life to the sea. That is to say, man may trace his ancestry to the ocean with its solutions of various minerals which constituted a congenial home for the reptilian life from which he seems to have descended.

Animals and plants inhabiting the sea live all their lives in an environment that contains every chemical element that can be needed, and their food has also grown in this same solution, so that it is unlikely that such animals and plants ever suffer from deficiency diseases due to the lack of any necessary food substance. This is not the case with land animals and plants that derive their mineral constituents from the soil. Certain substances such as nitrogen, phosphorus, potassium, and calcium must be constantly added to cultivated soils to maintain their fertility, and both men and other land animals are subject to disorders and diseases caused or influenced by deficiencies of calcium, phosphorus, iodine, iron, etc. People living largely on sea food, like the Japanese, rarely suffer from this type of deficiency disease.

Alaistair MacGregor in his recent book, entitled *Over the Sea to Skye*, says that the sea-faring inhabitants of those sea-girt isles on the coast of Scotland, although living under insanitary conditions in a rainy, foggy climate deprived of health-giving sunshine, yet on account of their diet, consisting largely of sea foods, are not subject to deficiency diseases. Scurvy, beri-beri, and goitre are practically unknown among them.

## Salmon in Relation to Goitre

Goitre is a deficiency disease of man and the animals widely distributed over the earth's surface, occurring for the most part in mountainous districts remote from the sea. It is due to a lack of iodine in water and food. Iodine and the chemical compounds containing it are very soluble in water, and are, therefore, easily leached from the soil and collected in the ocean, which now contains nearly all the world's supply of this invaluable element. Plants grown on soil deficient in iodine, themselves lack iodine and thus contribute little of it to the diet of man and animals. Goitre frequently results.

Germany proposes to combat the increase of goitre among human beings and farm animals by inducing fertiliser concerns to include iodine salts in their patented fertilisers, which have largely replaced imported Chilean saltpetre which contains some iodine naturally. Director Krohne, of their Health Department, in requesting the Prussian Diet Finance Committee for a 50,000 mark appropriation to use in the fight against goitre, said that the increase in this disease was directly traceable to the change in fertilisers and the consequent iodine depletion of the soil, plant foods now containing little or no iodine.

**Newtown Hairless Pigs (Goitrous)**

*(Courtesy of Professor J. W. Kalhus, Washington Agricultural College.)*

There is a wide belt across Northern United States and Southern Canada, particularly in the mountain and Great Lakes regions, in which goitre is prevalent. Analyses of drinking waters from these sections show that the iodine content is very low; fruits and vegetables grown there are also deficient in iodine. Farmers suffered great losses in calves and pigs, which were frequently born suffering from this disease and too weak to live, but it was found the disease could be prevented by feeding fishmeal made from the waste parts of salmon and other sea fish which contain a considerable amount of iodine. Within this goitre belt the Pemberton Valley lies, in the Coast Range of British Columbia, Canada. It is some fifty miles long, and is watered by the Lillooet River, which flows from a glacier. In former years every white baby born in this valley had a goitre, and women developed one within a few months after coming there. Goitre was especially severe on livestock. There was a mortality of 90 per cent. of all calves born, 85 per cent. of the colts, and no pig survived more than one day after birth. Abandonment of the valley was at one time seriously considered. Dr. W. D. Keith, writing in the *Canadian Medical Association Journal* for April, 1924, describes the situation in the Pemberton Valley, and goes on to say:

> "Situated at the lower end of the valley at the junction of these two rivers is an Indian Reserve, peopled by about 150 Indians whose forbears have lived in the same place as far back as the knowledge of the white man goes. In the Indian village no sanitation has ever been attempted, and amongst these Indians there is no goitre, nor has there ever been a case recorded. Only on rare occasions has a litter of myxœdematous pigs been born on the reserve.
>
> "Whilst considering the lack of goitre amongst these Indians, I would like to draw attention to the fact that they eat a great deal of salmon. The fish come up the Birkenhead to spawn, and many millions of eggs are secured at the Government Hatchery a mile above the village. The Indians are allowed to use the spent

salmon, and annually cure thousands of fish for winter use. Their pigs also eat the dead salmon washed ashore on the gravel banks of the stream. It is quite probable that the Indians and their pigs get enough iodine from the salmon to give their thyroids the necessary quantum of this element."

Dr. H. W. Wiley, the world-known pure food expert, in the March, 1927, number of *Good Housekeeping* magazine, has the following to say regarding the great value of the iodine in salmon in connection with the dietary:

"A writer in the *Journal of the American Medical Association* for May 1, 1926, urges the use of canned salmon as a prophylactic for goitre. It is comparatively cheap and is a valuable food in any diet for the prevention of goitre. The red salmon has the largest amount of iodine—namely, 405 parts per billion, chum salmon the least with 222 parts per billion. Compare this with the amount of iodine, for instance, in lemon juice, which is 136 parts per billion, and milk, which is 5 parts per billion—a mere trace. Attention is called to the fact that the salmon packed at the beginning of the packing season is considerably richer in iodine than later on. It is at this period that most of the canned salmon is prepared. The author closes his article with the following statement:

"'It appears that the systematic use of these foods which are rich in iodine would be of considerable benefit in the treatment of simple goitre, or for its prevention in goitrous regions. Canned salmon, on account of its cheapness and availability, is particularly suitable and should be included in the diet for the patients.'"

## Vitamins

Dr. E. V. McCollum, Professor of Chemical Hygiene, Johns Hopkins University, Baltimore, U.S.A., and an international authority on nutrition, writing for the U.S. Bureau of Fisheries Bulletin No. 1000 (1926), says:

"On the evidence brought to light by the extensive researches in the field of foods and nutrition during the last twenty years, it is now universally believed that there exist a number of chemical substances that are indispensable for normal nutrition in man and animals. When one or another of these is left out of an otherwise complete diet, certain pathological symptoms appear, which can be produced in no way other than by vitamin deficiency. The diseases characteristic of vitamin deficiency can be prevented or cured only by the inclusion in the diet of the vitamin with which each is associated. No one or more of the vitamins can be omitted from the diet without profound disturbance to health. Fortunately, most of our ordinary foods contain at least small amounts of one or more of them, so that when we eat a fairly wide variety of natural foods the danger of vitamin deficiency is small, except in the case of a single one—viz., vitamin D.

"The vitamins are of unknown chemical nature and are known by the names vitamin A, vitamin B, vitamin C, vitamin D, and vitamin E.

"Vitamin D is especially interesting in that it is contained in very small amounts in any foods thus far studied, except in the oils of fishes. Many foods of both animal and vegetable origin are apparently entirely lacking in it. The leaves of edible plants contain small amounts of it, at least in certain cases. Cereals, tubers, root vegetables, lean meats, ordinary animal and vegetable fats, fruits, etc., are entirely lacking in this remarkable nutrient principle. Vitamin D is especially important in the diet for the purpose of insuring the normal development of the bones. The condition which results from starvation for this vitamin (when the diet is not properly constituted with respect to certain other nutrients, especially calcium and phosphorus) is generally designated as rickets. It is not confined to the bones, but affects all the tissues of the body and may result in profound damage to health. Curiously enough, while the vitamin D is very abundant in certain fish oils it is apparently entirely lacking in the liver fats and in the other fats of the bodies of mammals, such as beef, pork, etc."

"It has long been observed that in regions where fish are regularly eaten in considerable amounts goitre is rare, whereas it is very common in many regions because of lack of iodine. Sea foods such as fish furnish this element in appropriate amounts to supply the needs of the body. A similar statement may be made concerning rickets in children. Even in those parts of the world where the climatic and hygienic conditions are such as to favour the development of bone defects these are rare among children where fish forms a prominent article of diet."

"Modern researches on foods and nutrition have brought to light many surprises, both as regards the nutritive needs of the body and the dietary properties of individual foodstuffs, among which the most marked contrasts have been found. In no case have any foods gained more recognition as having unique dietary values than have the principal fish and shellfish."

So we see that it is well to include canned salmon in our dietary and to use it regularly and frequently, and it may be that should we forget to do so, a sudden distaste for our diet, which is frequently much too limited, may lead us back to this highly nutritious and health-giving sea food, and as we enjoy the finely flavoured fish in sandwich, salad, or in cooked dishes, let us think of the splendid salmon as they come in from the cold ocean waters of the north, strong and vigorous, rich in stored-up fat for their long, arduous journey to the stream in which they were born and spent their early life. Few animals or other fishes have a life-history surpassing in interest that of the valuable Pacific salmons.

(*To be continued.*)

# Nutritional Bread (Cheese)

By J. BOYD

ALTHOUGH ALL varieties of bread really come under the above heading, I intend in this series of articles to deal with speciality loaves that are made to suit the many different palates or constitutions of people who cannot eat the ordinary varieties made daily, either from their own pet theories about this matter, or, as in many cases, according to their doctor's instructions. The several varieties to be dealt with will be considered from the standpoint of food value; also the nutrient content of the ingredients used will be fully emphasised.

Not one of the loaves mentioned here is of the proprietary class; at the same time, they are not by any means my original ideas, rather are they a compilation of formulæ brought together during a long experience in bakeries.

All the formulæ may be relied upon to turn out satisfactory loaves. The quantities are given in small lots, which may be increased or decreased to suit the individual requirements of all who care to try them for themselves.

PARMESAN BREAD

| | |
|---|---|
| 2¼ lbs. ordinary wheatmeal | 2¼ lbs. strong flour |
| 1 lb. parmesan cheese | 2 ozs. yeast |
| 2 oz. sugar | 1 oz. salt |
| ¼ oz. white pepper | ¼ oz. mustard |

Water at 115° F., sufficient to make into a fairly stiff dough.

*Method.*—Mix wheatmeal, flour, and grated cheese well together; make a space in centre (print is the usual term); into this print place the other ingredients (with the exception of the yeast) and well mix; now add the yeast, which has been dissolved in a little of the water (about 90° F.); knead thoroughly, thus blending the whole mass into an even dough. Place in warm corner for 1 hour; knead well and weigh into 12 pieces of 12 ozs. each. Mould into loaf form and put into greased and slightly warmed tins; allow to prove for 30 minutes, then bake in warm oven for about an hour. In place of using parmesan cheese, ordinary strong, cheaper cheese may be used. In this case, pass the 1 lb. of cheese, skin included, through a small mincer, put this pulped mass into print and mix well with part of the hot water before drawing in the meal, etc. For a commercial loaf, the flavour of cheese obtained by this method is difficult to improve upon.

These loaves possess better keeping qualities and nutritional value than an ordinary loaf. The proteins of the flour are increased almost 2 per cent. by the presence of the cheese, and the fat content is practically doubled.

The quantity and quality of the lime and phosphate salts are also great points in favour of this bread.

I have read that in parts of America where this kind of bread was made the demand was far greater than the supply. My own experience has been that, provided a reasonable charge was made for the finished loaf, this proved a nice little sideline and helped to advertise the business considerably.

For selling purposes, the loaves may be wrapped in cellophone paper, fastened with two gold paper seals.

The firm's name and the name of the bread, printed on an attractive narrow paper band, is then fixed over the cellophone paper and around the loaf.

By using this transparent paper in place of the waxed paper in general use for bread wrapping, the parmesan loaf (let us call it) is set off to advantage and finds a ready sale. I can assure readers interested in the manufacture of bread that if they try this cheese variety customers will ask for more, as did that Dickens character. Regarding the cost of manufacture, including the paper wrapping and labour costs, and using the cheaper yet stronger cheese, each loaf will cost approximately 3d. each. Sold retail at 6d. each would mean a reasonable profit for such a speciality.

## Death of Mr. Charles Bond

IT is with deep regret that we have to announce the death of Mr. Charles E. Bond, at his residence at St. Margarets-on-Thames, on Tuesday, July 24. Mr. Bond, who has been in failing health for some time, was a Director of this Journal since its inception, and was similarly associated with Leonard Hill Advertising, Ltd.

The loss of his genial and commanding presence will be deeply felt by his many friends amongst the readers of FOOD MANUFACTURE. He was one of the best known and most popular personalities of Fleet Street.

The funeral and service took place at New Cemetery, Willesden, on July 26.

# Spoilage of Preserved Meats

BY E. W. LEWIS, M.A., PH.D.

*Knowledge is certainly a power so far as the prevention of spoilage of preserved meats is concerned. Unfortunately, the extent of our knowledge is limited, but is capable of vast extension; for this we have to await the growth of research and experience. Undoubtedly a time will come when our understanding of the mechanism of spoilage will be sufficiently complete to enable us to overcome the difficulties and troubles that beset the practices of to-day. Certainly we must follow the advances of science, and below are brought together the principal data.*

## PART I

THE NATURAL processes and causes which lead to the spoilage and deterioration of preserved meats are many, the final result in all cases being the decomposition of the meat product and hence rendering it unfit for human consumption. Savage (Local Government Report No. 11 [1922]) states that the total amount of canned meat lost through spoilage is enormous, though now relatively small in proportion to the immensity of the industry. From the economic standpoint it is desirable to diminish this wastage to the lowest possible figure. One avenue to be explored to bring down spoilage is to identify the bacteria which cause deterioration, ascertain their modes of introduction, elucidate the conditions necessary for their growth, and study the efficiency of the sterilising processes in the light of the actual type of organism found, both before and after canning. The spoilage of canned meat products is a complex process consisting of a series of reactions which vary with the kind of bacteria present, the quality of the meat, and various other conditions.

Rector gives the following table as being the principal causes of spoilage of meat canned products:

- Causes of Spoilage
  - Insect Life
  - Micro-Organisms
    - Moulds
    - Yeasts
    - Bacteria
  - Autolysis
  - Foreign Substances
    - Metallic
    - Chemical
  - Chemical and Physical Decomposition
    - Oxidation
    - Actinic Rays
    - Colloidal Reactions
    - Temperature Changes
    - Water Damage
    - Fire Damage
    - Humidity
    - Evaporation

A study of the stages of spoilage gives valuable data for devising methods of counteracting the decomposition process, and hence for applying these methods in the meat and food preserving industry in general.

Previous to the systematic study of meat bacteriology, it was considered that any food spoilage was due to the operation of chemical agencies; more recently, much attention has been given to the biochemical aspects of the question. The spoilage of preserved meat products due to insect pests can be caused by actual consumption of the products by the insects, depositing insect-parasites, larva, excrement, and other débris of their life processes, finally resulting in rancidity of the products. One of the most difficult insect-parasite larvæ which has to be contended with in meat canning processes is the larva of the flesh-worm (trichina). In isolated cases it has been found in live animals during an outbreak of disease; it is only continued cooking that can effectively kill all the larvæ. Cattle suffering from trichina are easily identified by a veterinary surgeon, and no cattle which have been associated with a herd containing cattle suffering from trichina should be used for meat preserving purposes. Insects may lie in a dormant state for long periods of time, and then revive when favourable conditions return. The outstanding insect enemies of canned meats are species of flies which find an opportunity of depositing eggs and finally larvæ in the meat products; before canning, efficient cooking is essential for the destruction of the larvæ.

### Bacteria

Meat products are excellent media for the propagation of bacteria; in fact, meat extracts are used largely as a media for the developing of bacterial colonies in bacteriological analysis. However, canning experience has shown that, in the presence of a brine solution, meat products are almost immune from bacterial activity. This is a remarkable fact, since fish products are easily attacked by bacteria even when saturated with salt. Pope (English Pat. No. 139100 [1919]) proposes the following method of sterilising particular meat products which are prone to deterioration. The meat is treated as follows prior to canning: It is placed in a double-walled chamber, the development of bacteria being prevented by suppressing the negative electrical field and the negative earth field by superimposing an artificial electrical field on the electrical earth field and

in an opposite direction thereto, or by passing moist air into the chamber which is insulated from the earth, the air being primarily passed over moist layers or over metallic conductors.

The deterioration of meat products is largely due to resistant spore-forming bacterial activity and putrefying bacteria. It varies widely and is controlled almost entirely by the care and cleanliness which have been exercised in the treatment of the meat prior to the canning process, and by the combative measures which have been adopted by man to render the meat products unpalatable and unsuitable for bacterial growth, such as by salting. More recently, the method adopted in the canning industry is initially to sterilise the meat product by cooking methods and then place the product in a hermetically sealed container and hence render the meat product immune from external bacterial activity. The sterilisation by heat is primarily a method of destroying micro-organisms, as bacteria exert certain selective actions on definite substances or groups of substances at varying temperatures. The time required for sterilisation varies with the initial contamination; it is desirable, therefore, to reduce this as much as possible.

Evacuating canned meat products has no real sterilising value except in special instances, such as in the case of salt meats. Spoilage of foods due to organisms was first suggested by Pasteur, followed by Russell of Wisconsin, who was the pioneer in applying Pasteur's theories to canning problems. The latter found that undue delay in handling the raw material assisted in the introduction of highly resistant, undesirable micro-organisms, which require excessive heating which tends to make the finished product unpresentable. Spores of spore-bearing organisms are difficult to destroy in boiling water, but at 240° F. they are destroyed in fifteen minutes. It is also an important fact that they will not develop in media of over 0·3 per cent. acidity; this fact is of considerable value in canning acid fruits. Savage (Food Invert Report No. 11) states that "we have to regard canned meat, at the best, only partially sterilised and for the most part as containing viable bacilli, many of which are of a decomposing type. The food is sound rather on account of its being free from oxygen than because it is sterile." A theory has been propounded that bacterial deterioration of meat products is due to the rupture of the fat molecule, decomposition of the glyceride, acid substances being produced, with the final appearance of rancidity.

### Refrigeration

Some micro-organisms are destroyed by freezing, but these are few in number, the majority of spores are not, and directly the conditions suitable for their growth reassert themselves, particularly when moisture condenses on the surface, they will germinate, revivify, and grow. If the meat is frozen and then brought to room temperature, autolysis has already taken place, and any decomposition present becomes much more virulent due to the simpler products formed by autolysis which serve as nutrient matter for bacteria and greatly increase their growth. This may be one reason, in addition to the physical effects of the breakdown of cell walls by freezing, for the more rapid decomposition of meat which has been in cold storage for some time. However, the influence of rapid cooling after heating is a matter of considerable importance in the canning industry; its value in the "blanching" of goods was first mentioned by Benson.

### Sealing

In many cases an unsterile product will keep indefinitely if properly sealed. This, however, is not true in all cases, and sealing should not be expected to take the place of proper processing because of the danger of spoilage due to spore-forming bacteria. It has been shown by several investigators that the death of micro-organisms when subjected to any fixed unfavourable conditions will occur in conformity with the well-known equation of monomolecular reactions; expressed as

$$K = \frac{1}{t} \log. \frac{B}{b}$$

in which K is the velocity constant of the rate of death of bacteria, a constant.

$t$ = interval of time between observations.

B = number of bacteria at the beginning of any time interval.

$b$ = number of bacteria at end of time $t$.

Tests with the spores of *Bacillus pseudo-tetanicus* have shown satisfactory agreement with this law

## Irradiated Milk

INTERESTING possibilities are opened up by the work of K. Steer and P. Rosenthal on the anti-rachitic effect of milk irradiated in an atmosphere of carbon dioxide. One of the difficulties has been the alteration of taste in fats and the production of undesirable changes in the proteids by ultra-violet rays. The German workers show how they endeavoured to overcome these difficulties by irradiating the milk in a special atmosphere. The milk is kept during treatment in a closed cistern containing $CO_2$ under pressure. Oxygen is first expelled from the apparatus and from the milk by passing $CO_2$ through them. The milk is then sent at low pressure through a number of chambers cooled with water and fitted with a quartz plate on one side, the thickness of the milk film being about three millimetres. It is subjected to rays from a quartz mercury vapour lamp at a distance of about four millimetres. Owing to water cooling, the temperature of the milk is not raised more than two degrees. It is said that the milk so treated is somewhat acid, and has a "pleasant pungent" taste due to $CO_2$, otherwise, it is practically unchanged in taste and smell.

The authors quote numerous clinical experiments to show its value in therapeutics: they claim it will cure florid rickets in from four to six weeks, and that it is easily digestible and pleasant to take.

# Gelatine

By KATHLEEN PEARSON, S.R.N.,
*Matron, Children's Sunlight Home, Stillorgan, Ireland,*
AND
PAUL I. SMITH,
*First-class Diploma in Leather Manufacture, Leathersellers' Technical College, London.*

*The two previous articles dealt with the properties, applications, and the technical valuation of the various grades of gelatine. Below will be found a simple description of the manufacture of the product.*

## PART III.—THE MANUFACTURE OF GELATINE

BEFORE THE actual processes of gelatine manufacture can be adequately described, some account must be given of the materials from which this produce is made.

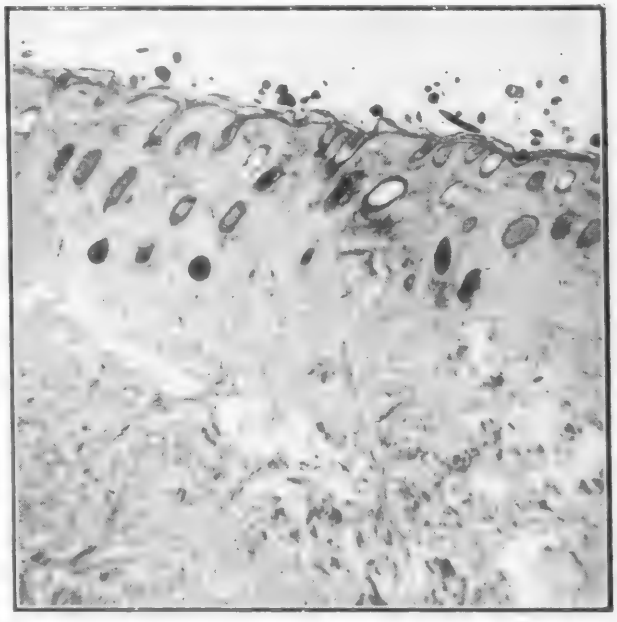
### Raw Materials

The tanner, butcher, fishmonger, and furrier provide the manufacturer with his raw materials, which, taking them in the order of value, are as follows: Hide and skin waste or offal, fleshings obtained during the manufacture of leather, bones, sinews, tendons, cartilage, horn piths, leather and furriers' waste.

The first material mentioned, namely hide and skin waste, may be divided into a number of different varieties, the offal from the various kinds of animals being kept quite separate, as each has a distinct marked value and possesses its own characteristic properties. A short description will now be given of the most important varieties of stock utilised by the manufacturer.

*Calf skin.*—From this source the glue manufacturer obtains the material for some of the best and clearest gelatine. The skin from "very young animals" contains an appreciable amount of chondrigen, the presence of which is not desirable in stock for best quality gelatine, as it yields on boiling a substance named chondrin which resembles gelatine, but is weaker in gelatinising and adhesive properties. It is the usual practice to keep the "roundings," "pates," and "fleshings" quite separate, as they are priced differently, the best figure being obtained for pates. The majority of tanners keep the roundings and pates piled in heaps covered with sacking which has been damped with lime liquor, whilst the fleshings are preserved in a weak solution of lime. This procedure is to be recommended, as the small amount of carbonation which takes place during exposure facilitates the process of deliming at the gelatine works. The lime solution also has a beneficial effect, inasmuch as it keeps the stock sweet and in good condition generally.

Calves' feet do not yield a large quantity of glue but are of special importance as they yield, when boiled, neatsfoot oil.



**Transverse Section of Calf Skin, showing Epidermis and Hair Roots, and Structure of the Dermis. The Fat Cells are also displayed.**

*(Courtesy of Newton and Co.)*

Skin offal obtained from sheep and goatskins is not used to such a great extent in the manufacture of gelatine, but is highly prized as raw material for high grade glue—the same applies to hide waste, which includes cow, heifer, bull, and horse.

*Ossein from horn piths.*—A very good quality gelatine is made from ossein, the preparation of which is as follows:

The horns of animals, when dry, contain a loose pith, which may be said to consist of two portions—organic and inorganic; it is the former which is utilised by the gelatine manufacturer. The separation is achieved by treating the stock with dilute acids followed by continual washing with cold water. The remaining organic portion is then treated in the same way as ordinary stock.

All material for the making of ossein is first degreased in the same manner as bones used for glue manufacture.

### Preservation of Stock

In order that the process of gelatine making may be continuous, it is necessary that the manufacturer keeps a large stock of raw materials. Gelatine stock is a highly perishable substance, and in order to preserve it, special precautions have to be taken.

The usual methods which the manufacturer makes use of for keeping the stock sweet and fresh are the following: "Liming," "desiccating," and "salting."

The first to be mentioned is probably the most popular. Hide and skin offal is subjected to the prolonged action of a solution of calcium hydroxide —*i.e.*, milk of lime; very often antiseptics are added to the liquor, such as phenol, 1 in 1,000, or formaldehyde, 1 in 20,000. The liming is carried out in large concrete or wooden vats, and the stock, as it arrives from the butcher or tanner, is simply thrown into these pits and left until it can be used.

Desiccating is carried out by carefully drying the stock in well-ventilated rooms; the pieces of hide and skin being dried on netting in a current of dry, cold air.

Salting is not very often practised by the manufacturer, as it entails some considerable expense, and chlorides may creep into the finished product; their presence is distinctly objectionable in edible and photographic gelatines.

Limed stock from the tanners is always preserved by liming. Green stock from the butcher is generally desiccated or limed according to convenience, while salted material is preserved by further salting.

### Soaking and Washing

The two processes, soaking and washing, are always carried out conjointly and nearly always by machinery.

The most popular mechanical device for quickening up the soaking, etc., is the tumbler. This is simply a barrel mounted horizontally on its axis, with baffles on periphery to keep the stock from sliding. The stock and water are introduced through an opening in the cylindrical side of the vessel which is closed during rotation.

Paddles provided with a false bottom controlled with a cock for draining off the waste water are in common use. They are very satisfactory, but the time taken for complete washing is somewhat longer than when the tumbler is used.

Other washing machines in use both in England and America are the hollander and cone mill, the latter being the more popular.

The time necessary for washing depends entirely upon the nature and condition of the stock. It cannot be carried out on purely empirical lines, but considerable discretion must be exercised.

Cold water is used, since although warm water would remove blood and dirt quicker, it has a tendency to hydrolyse the skin proteins especially if they are in the least decomposed.

### Liming

If the stock has already been limed by the tanner, or preserved in lime liquor by the gelatine manufacturer for any length of time, then liming can be considerably curtailed. Limed stock requires perhaps only a day or so, while "green" or unlimed material must be treated from thirty to sixty days.

If the material is shredded or cut into small pieces by machinery prior to liming, then this process can be conducted on more satisfactory lines. Lime has the following action on hide and skin proteins; it swells and finally dissolves the hardened cells of the epidermis, loosens and dissolves the mucous or growing layer and hair sheaths. The fibres of the corium swell and absorb water, thus causing the hide or skin to become plump and swollen. It dissolves all mucins and albumins which are present in hide, as well as saponifying a small percentage of the neutral greases.

Sometimes antiseptics are added to the liquors in order to prevent putrefaction. Those in common use are phenol, formaldehyde, sodium peroxide and bleaching powder; whenever possible, the use of such chemicals should be avoided, as they are most objectionable impurities if present in the finished product.

In order to quicken up the process of liming it is a practice to add a certain amount of soda to the limes; thus Fleck recommends 2 parts soda and 3 of quicklime to 300 to 400 stock.

About 2½ per cent. quicklime on the weight of material may be said to be the average amount used in this country, with the addition of ½ to 1 per cent. soda.

### Washing and Deliming

When the liming process has been satisfactorily concluded and the stock is in the desired condition, it is subjected to the action of running water and weak acids in order to remove the limes and hydrolytic products.

The washing is generally conducted in a paddle and continued until the water runs clear and shows but faintly alkaline; acid is then added to hasten the removal of the remaining lime and salts. During the washing, the water in the paddle is allowed to overflow by means of a hole in the side of the vessel, fresh water being continually added to make good the loss. When the acid is added the fresh water supply is stopped and a wooden bung put in the hole.

The deliming should be prolonged until the hide pieces are swollen almost to the maximum, which occurs at a concentration of 0·0025 grms. of hydrogen ions per litre. Of course, such a concentration of acid cannot be used commercially, and a solution containing several hundreds that amount of hydrogen ions must perforce be employed. Then, when the alkalies in the stock have been neutralised and the stock is in an acid condition, the maximum swelling can be produced by careful washing in cold water.

As regards the nature of the acids used and the quantity, there are many considerations. Chemically pure hydrochloric acid would fill the rôle of an ideal acid for the process, were it not for the fact that it

sometimes contains traces of such mineral salts as iron and arsenic, both of which are, of course, distinctly objectionable. In view of this, it is always advisable for the manufacturer to test consignments of acids on delivery. Sulphurous acid, another acid more or less suitable, has the great disadvantage of forming sulphites which cannot be easily eliminated and which sometimes find their way into the finished product. If the manufacturer uses only hydrochloric acid that is free from harmful quantities of arsenic and iron, then the difficulty is more or less overcome; or if he uses sulphurous acid and sees that all traces of sulphites are effaced by repeated washings. After well washing in cold water in order to free from all acid, the stock is dried in a well-ventilated drying-room on cotton or zinc netting; then, when dry, it is ready for boiling.

## Extraction

There are two general methods of extraction, the open and the closed.

The open process of boiling is carried out in large pans, preferably made of aluminium, the heat being applied by means of an open fire, steam-jacket or coils, by forcing live steam into the liquid or by a water-jacket. The best means of heating is achieved by the use of the steam-jacketed pan, as this method allows of better regulation of temperature than any other. The use of steam coils entails waste of energy by friction of the steam in the coil, considerable expenditure and liability of joints leaking. When live steam is used, the temperature is always uncertain, and condensation occurs unless the steam is superheated. Water-jackets were once the common means of extraction, but owing to the difficulty in maintaining one fixed temperature they have fallen into disfavour. As regards heating by means of an open fire, the disadvantages of this method are all too obvious—over-heating in certain parts of the boiler causing burning of the stock; impossibility of regulating the temperature and consequent loss by hydrolysis through inability to do the same.

As regards the closed methods of extraction, these are carried out in autoclaves under a pressure of from 10 to 15 lbs.; bones, etc., are always extracted by this means, and for this material the closed method is eminently satisfactory. For hide and skin offal boiling under pressure slows down extraction, as when water is squeezed out of the stock it is replaced only very slowly.

The following conditions are desirable as regards boiling:

High concentration of glue liquor.

Immediate removal of dissolved glue from zone of highest temperature.

Minimum pressure.

Production of a clear liquor.

The stock is dumped into the boiler until the latter is almost full, then covered with hot water. Heat is then applied, and the temperature maintained at 140° F. for several hours, or until the liquor has dissolved at least 6 to 7 per cent. of its weight of glue. The liquor is then drawn off through a valve in the bottom and fresh water added.

The heat is now maintained at 10 to 15 degrees higher, and after about the same time the liquor is drawn off as before. Four or five more such "runs" are generally made, the last being at a temperature of about 210° F.

For the modern method of extraction of bones the reader is referred to the patent literature. See A. Pansky, E.P. 221, 702, 3/12/23.

## Clarification and Filtration

After extraction, the gelatine liquor is run into large shallow vats. A temperature of 60° C. is maintained, when the grease rises and is skimmed off, and the flocculent impurities settle.

The commom impurities in the liquor are undissolved organic matter, albumin and mucins, lime soaps, grease and hair, as well as mineral and bone particles. This suspended material can be removed by filtration if desired, instead of merely allowing it to settle on the bottom, which takes a considerable time. The ordinary filter press or centrifuge can be used, the former being preferable when some convenient form of cellulose is used, such as a good grade of cotton paper pulp.

If the gelatine is of good quality, sometimes filtration is sufficient, but generally the solution needs clarifying in order to produce a bright and clear result. Amongst the common clarifiers are, alum followed by a small quantity of milk of lime, calcium sulphate, albumin, blood, and oxalic acid. The best and oldest known material for coagulation is egg albumin dissolved in water. This is used for really high-grade gelatines.

Before adding the clarifying agent, the temperature of the solution should be lowered to 53° C. (130° F.) and the clarifier well stirred in. The temperature is then raised to about 93° C. (200° F.), when complete coagulation occurs, and the precipitate carries down with it all the impurities. For complete separation of precipitate about thirty to forty-eight hours should be allowed.

Bleaching is often practised by some manufacturers, using sulphur dioxide, sodium hydrosulphite, basic zinc salts, or formaldehyde, and a large number of common reducing agents.

If good quality stock has been used in the first place and the conditions of manufacture have been really hygienic, then bleaching is quite unnecessary; it is most undesirable for edible and photographic gelatines.

## Evaporation

The gelatine liquor is now ready for the vacuum pans, of which there are many forms. More attention has been paid to the construction of evaporating vessels by inventors than to any other part of the plant; the result is that this difficult process can now be carried out fairly successfully.

It is advisable to evaporate the dilute liquor from the clarifying vats in the low vacuum, high temperature pan, and finish in the high vacuum, low temperature pan, thus employing a double vacuum and using the gentler heat on the concentrated liquors and minimising total hydrolysis.

The vacuum should be maintained at the highest possible point, so that the temperature may be maintained at the minimum consistent with rapid evapora-

tion. One of the best evaporating plants on the market is the Triple Effect Multiplex Evaporator of Blair, Campbell and McLeane, Ltd.

When the liquor has reached the required concentration it is ready for cooling and spreading.

### Cooling

This is one of the most dangerous processes—*i.e.*, from the manufacturers' point of view, in the whole process of gelatine production, as there is a great possibility of the gelatine being ruined by liquefying bacteria such as bacillus subtilis, which is present in the air and the spores of which are not destroyed even at a temperature of 120° C.

The danger can be more or less overcome, providing that the room where the cooling takes place is well ventilated, the air properly circulated, and the temperature and humidity accurately regulated.

From the evaporating pans the liquor is run into metal cooling pans made of stout sheet zinc, heavily galvanised iron, or aluminium, preferably the latter. A low temperature is maintained by means of one of the many refrigerating machines now on the market. The temperature should never be allowed to go below 33° or 34° F. as, if frozen, the jelly is hard and cutting is rendered impossible.

Sulphites, if they have been used for bleaching, should be completely removed by means of hydrogen peroxide or some other suitable oxidising agent added during clarification.

When the jelly has been cooled it is removed from the pans or vessels by cutting, immersing in hot water for a short time, or by exposing to steam, the pan being returned for refilling.

The cakes of jelly are then cut into thin sheets, either by machine or hand, and these laid out to dry on cotton netting.

### Drying

In England, the drying of the sheets is generally done in well ventilated lofts supplied with fans screened from dust, and suitable cooling apparatus. The sheets are generally spread out on cotton netting and allowed to dry at a temperature not exceeding 21° C.

In America the drying is conducted in long tunnels or alleys, so constructed as to receive trucks stocked with perhaps twenty frames covered with zinc wire netting supporting the gelatine sheets or leaves. The alley is just sufficiently long to insure that the sheets are perfectly dry when they leave it. As regards the circulation of the air, this is cooled and drawn through the tunnels counter current to the progress of the trucks.

Considerable care must be taken in thundery weather to see that the gelatine liquor or jelly does not become liquid or foul. Rideal, in referring to this danger, writes: "Glue liquor and jelly absorb ozone with avidity, and are decomposed by it into oxidised products with no gelatinising or adhesive power; this may be the reason why an approaching thunderstorm is reputed to cause great damage in destroying the coagulating powers of the glue soups, or causing the glue to turn on the nets."

A wet or dry bulb thermometer is now always used by the up-to-date manufacturer, in order that the humidity and temperature of the drying-rooms or tunnels may be accurately determined.

When perfectly dry, the gelatine is taken off the nets or frames, when it may be regarded as ready for direct sale, powdering, or flaking according to its quality. Best quality edible gelatines are generally sold in the form of thin sheets.

It should be noted that some manufacturers degrease the finished leaf gelatine if in the least "greasy"—pure benzene is used.

# Canadian Dairy Statistics

THE DOMINION Bureau of Statistics has forwarded to the High Commissioner for Canada in London copies of its Report, "Statistics of Dairy Factories in Canada, 1926."

According to the Report in question, the number of dairy factories in operation in the Dominion during the year was 3,047, an increase of 35 over the preceding year, and of 114 over 1924. The 1926 total comprises 1,269 creameries, 1,418 cheese factories, 334 factories making butter and cheese, 26 factories making condensed, evaporated milk, milk powder, etc. The number of creameries shows an increase of 29 over the preceding year, the number of cheese factories an increase of 28, and the number of condensaries an increase of 2, whilst the number of combined butter and cheese factories shows a decrease of 24.

The total number of farms supplying milk to dairy factories in Canada during 1926 was 330,382, as against 317,762 in 1925 and 319,489 in 1924. The number of cows whose milk was sent to dairy factories in 1926 was 2,308,813, as compared with a total of 2,344,603 in 1925.

The total quantity of milk delivered to factories during the year was 2,859,552,382 pounds, and the deliveries of cream to factories had a total butter fat content of 149,078,594 pounds, the approximate amount of milk required to supply all factories reaching a total of 7,118,940,782 pounds.

The total quantity of creamery butter made in Canada in 1926 was 177,209,287 pounds, an increase of 4½ per cent. over the previous year's total. Factory cheese production in 1926 amounted to 171,731,631 pounds, a decrease of 5,407,482 pounds during the year, an increase of 22,024,101 pounds over the 1924 output. The total value of the output of condensed and evaporated milk, milk powder, etc., in 1926 was $9,601,138, a decrease of $243,475 during the year. The total value of all products in Canadian dairy factories in 1926 was $133,353,076, and the total capital investment reached $47,091,589. Employees numbered 12,069 in all. Exports of Canadian dairy products in 1926 had a total value of $41,322,384, a decrease of $16,065,906 from the 1925 figures.

# Overseas News

## Canned Goods in Unlacquered Tins still being refused Entry into Argentina

ACCORDING TO information contained in a cable of June 12 from Commercial Attaché Dye at Buenos Aires, the regulation prohibiting the entry into Argentina of canned acid foods not packed in internally lacquered tins is still being enforced by the National Chemical Office, and it will be necessary, therefore, to continue to observe this requirement in shipping canned foods to that country. The acidity of canned salmon, which is now determined by litmus paper, a method adopted by the chemical office last January, and of certain canned fruits has been found to be such as to permit the entry of those products in unlacquered tins, but sardines in tomato sauce in unlacquered tins are still refused entry.

Mr. Dye adds that rumours are frequently heard of the entry of goods which do not comply with the present regulation.

## Improved Transportation Boxes for Sardine Fish in Norway

One of the local box factories catering to the canneries has developed a new kind of double-box or case to be used to transport the fish from distant fishing grounds to the canneries, according to a report of May 23, from J. J. Meily, at Stavanger. It is claimed the new method keeps the fish in perfectly fresh condition for at least thirty-six hours after they are removed from the nets. The basis function of the new double-box is to prevent the ice from touching and thus bruising the delicate little fish.

The inner box, which is fitted with a lid, will hold approximately forty quarts of fish, which is sufficient to pack two cases of quarter Dingley tins of sardines. The space between the sides, top, and bottom of the two boxes is filled with crushed ice.

The transportation boxes hitherto and still largely in use have no inner case, so that the crushed ice must be placed in direct contact with the fish, with the result that there is inevitable bruising and other injury. The old style boxes, moreover, contain only sufficient fish to pack one case and proportionally more ice, so that they are less economical in space than the new style.

## New Fish Cannery at Halifax, Nova Scotia

A new fish canning plant was established recently in Halifax capable of turning out 10 cases, or about 500 cans of specially prepared fish per day, according to a report of May 7, from E. W. Magnuson, at Halifax. The fish are cooked under pressure with potatoes, onions, and seasoning, and sealed in cans. The product is called a "Fish Dinner." Another product is a fish chowder, somewhat similar except that the fish is minced with vegetables and a quantity of milk is added. It is understood that there is already a good demand for this product, and the firm, Arthur T. Spencer Company, expects to develop a large market both in the city and the province.

## Regulations Governing the Importation of Condensed Milk into Mexico

A federal regulation which became effective on October 18 requires that dairy products imported into Mexico must bear a legend indicating whether or not the product is manufactured from pasteurised milk, according to a recent report from Mexico City. It does not follow that the products not so manufactured are prohibited, but merely that the quality of imported dairy products must be unequivocally indicated on their labels.

Article IX. B of this decree is as follows:

> "Article IX. B.—Products derived from milk, such as cheese and butter, shall come protected by containers of tin, wood, paraffined cardboard, etc., which guarantee its perfect preservation, and shall be marked with labels in clearly visible letters, in Spanish, the declaration of the manufacturer as to whether the product was made with pasteurised milk or not. In case that the products are adulterated with oleo oil, margarine, or stearine, this shall also be stated on the labels. . . ."

## French Market for Canned Sardines

The demand for canned sardines in France is a very extensive one at the present time, according to a report from Havre, France, dated May 19, 1928. This product was entirely unknown in France before the World War, and efforts made by importers to introduce this commodity after the conflict remained unsuccessful, owing to the fact that at that time some British firms had introduced on the French market a product known as sardine paste which did not suit the French taste. Demand for the canned sardines is steady throughout the year, and it is believed that if prices remain unchanged for some little time to come, the sales might in the course of a year or two increase in a proportion of 500 per cent.

With regard to the sizes of the cans the preference seems to be for the one-pound tins, although it is presumed that there would also be a heavy demand for the half-pound tins. Sardines now being offered for sale in this particular district are preserved exclusively in cottonseed oil and tomato sauce.

Canned sardine imports are not stated separately in the General French Customs classification of statistics, but according to the information received from several food products importers at this port it has been ascertained that the total quantity of canned sardines imported through the port of Havre during the calendar year 1927 amounted to from 50,000 to 75,000 cases of 48 one-pound tins.

Price is the main factor affecting the demand for canned fish, and sardines in general, and it has been

noted that the great market at present for canned sardines is due to the fact that there has been recently an increase in the price of Canadian salmon and in Portuguese and French sardines.

### Department of Fisheries of Bengal to be Re-established

The Government of Bengal recently announced that it proposed shortly to revive the Department of Fisheries, which was abandoned about six years ago, according to a report of May 15, from W. H. Minor, Calcutta. In no other province of India is there a greater need of a Department of Fisheries than in Bengal. It has been estimated that at least 80 per cent. of the people consume fish as a regular item of diet, and the demand is said to be steadily increasing. The revival of the Department of Fisheries undoubtedly will be a boon to the fishing industry of this province, as it is reported to be in need of improvement and development schemes in order to place it upon an economical and successful footing.

### Crayfish Canning of South Africa

The revival of the report that a huge crayfish bed has been discovered, extending from Kosi Bay, in Zululand, to near Mossel Bay, is not needed to maintain interest in the crayfish canning and exporting industry of the Union, for the shipments are showing very satisfactory expansion again, according to information contained in the June issue of the *British and South African Export Gazette*. During 1927 exports totalled in value $16,598,537 against $15,931,120 in the previous year. The detailed returns, which are just to hand, show that France, the principal market, advanced its purchases from $455,261 to $581,955, while the United Kingdom increased from $275,502 to $298,341. Australia, though still only buying to an amount of $48,665, nevertheless nearly doubled its figure for 1926, and is evidently a promising market if actively developed. The United States, on the other hand, allowed its always small interest in this delicacy to decline further. Italy, after buying to the value of $10,891 in the previous year, practically dropped out as a customer. No other countries import South African crayfish to any extent, though many are taking sample quantities.

At present there are about fourteen canneries operating on the south and south-west coast of the Cape Province, each turning out about a million fish per annum; but if the report referred to above proves accurate an extension in the number of such concerns, and in their distribution up the east coast as far as Natal, may be looked for. From an import point of view, interest in this industry centres in the supply of tinplates and canning machinery, the former, of course, coming mainly from South Wales, while the mechanical equipment of the factories is of mixed British and American origin. The industry is to-day a valuable asset to South Africa, but it could undoubtedly be made a much greater one if a really adequate method were made to popularise its tasty product among the peoples of the world.

### Strict Compliance with New Proposed Food Regulations in South Africa Predicted

A more rigid inspection and subsequent compliance with the new food regulations projected for early enactment by Parliament is being predicted in foodstuffs circles in South Africa, according to a report of May 22, 1928, from Edward B. Lawson, American Trade Commissioner at Johannesburg. A considerable amount of publicity has been given to flagrant violations lately, and the rather sensational disclosures respecting the manner in which South African consumers have been defrauded by reason of the adulteration of foodstuffs were features of evidence given recently by experts before the Select Committee on the Foods, Drugs, and Disinfectants Bill.

It is interesting to note that the most serious charges were lodged against the South African manufacturers of foodstuffs and very little reference made to imported products.

### U.S. Imports of Canned Tomatoes and Tomato Paste

The following tables show the imports of canned tomatoes and tomato paste into the United States during May and during the first five months of 1928, compared with imports for the same periods of 1927. The tables have been compiled from figures released by the Statistical Division of the Department of Commerce:

| | *Canned Tomatoes.* | |
|---|---|---|
| | *First 5 Months, 1928.* | *First 5 Months, 1927.* |
| | *Pounds.* | *Pounds.* |
| Italy ... ... | 32,679,685 | 26,270,494 |
| Other countries ... | 266,797 | 216,461 |
| Total ... | 32,946,482 | 26,486,955 |

| | *Tomato Paste.* | |
|---|---|---|
| | *First 5 Months, 1928.* | *First 5 Months, 1927.* |
| | *Pounds.* | *Pounds* |
| Italy ... ... | 4,260,849 | 5,803,481 |
| Other countries ... | 307 | 9,671 |
| Total ... | 4,261,156 | 5,813,152 |

### Improved Breeding

"'OUR task is to produce by wise selection, proper feeding, and intelligent management a beef animal every cut of which will yield a tender, juicy dish,' said E. W. Sheets, Chief of the Animal Husbandry Division, Bureau of Animal Industry, U.S. Department of Agriculture, in an address recently before a meeting of live stock specialists at Grain Valley, Mo. In his opinion this goal can be attained. . . .

"In discussing the results of skilful cattle breeding, Mr. Sheets said: 'We have animals to-day whose shoulder cuts will produce a more toothsome steak or roast than a loin or rib cut from cattle less prideful of ancestry and less favoured in the breed lot. . . .'"—*U.S. Department of Agriculture.*

# Trade News

## Canned and Dried Fruit Trade of Bristol, England

IMPORTS OF canned fruit into Bristol, England, during the March quarter of 1928 totalled 2,268 short tons compared with 1,766 short tons during the same period of 1927. This increase was absorbed by American packers, and at this time there are no direct imports of canned fruits into Bristol except of American origin. This does not necessarily indicate a complete control of the trade, inasmuch as competition is apparent from Singapore, South Africa, Australia, and Continental packers, but the trend of the trade is distinctly favourable toward the American products, especially in peaches, apricots, and pears.

The statistics of imports into Bristol, while indicative of an increased demand, do not clearly define the actual trend of the trade, inasmuch as considerable quantities of canned and dried fruits are shipped via Liverpool and London for the West of England market.

In recent years Singapore pineapples have assumed a prominent position in the local trade, imports reaching Bristol through London and Liverpool. According to brokers this fruit has been gradually penetrating into the trade, and through the drop in prices a short while ago, together with placing the sliced article on the market, the Singapore product has become the most competitive fruit in the West of England trade, and is causing a slight drop in the demand for the Hawaiian pineapple.

The South African trade now improving is largely the result of a visit last year to South Africa made by a Committee from Bristol appointed by the Chamber of Commerce and Shipping. It is reported that this Committee formed connections for Bristol brokers with the South African packers, and the reduction in freight rates from the interior has permitted the South African exporters to compete with the Australian in this market.

According to local trade opinions, dealers are not kindly disposed to Australian products, because a continuity of quality in Australian brands cannot be assured. At least one recent shipment reaching Bristol was considered unsaleable on account of off flavour.

The statistics of dried fruit imports for the first three months of 1928 show a decline of 30 per cent. as compared with the same period of last year. Imports for the first quarter of 1928 totalled 711 shorts compared with imports of 1,030 short tons for the same period of 1927.

The total amount of raisins imported from January to March, 1928, inclusive, is given at 155 short tons, comparing with 460 short tons in 1927. It is observed that the decline occurred in the American product.

There are no dried apricots, peaches, plums, or pears offered in the Bristol market except of American origin, with some dried apricots from South Africa. The latter is of little importance, inasmuch as shipments are irregular and prices range along with the American dried fruits, which are in constant demand.

With regard to dried apples, it is interesting to note that the supply in the West of England is exhausted, and brokers are unable to obtain even small shipments. In view of the fact that the market looks for its supply to American exporters, the small California and Oregon apple crop last year has been felt in this market.

## Excursions to Confectioners' and Bakers' Exhibition, September 8 to 14

The London and North-Eastern Railway are this year running excursions from most stations in the North of England on their system on the night of Friday, September 7, and Sunday, September 9, for 1, 4, 6, 8, or 15 days. We believe that in the past, excursions have been run on the Friday night only, which is, to many, an awkward day to leave business. The excursion on the Sunday, therefore, will, we hope, suit a larger number of visitors to the Exhibition this year.

## Bakers' and Confectioners' Competition

Bakers and confectioners who intend to compete at the London Exhibition, if they are members of a recognised Bakers' Association, should have received a copy of the official schedule. Any member of the trade who desires a schedule but has not received one and who is a member of any association should apply to his secretary, but anyone who is not a member of an association should apply to H. S. Rogers, 11, Queen Victoria Street, London, E.C., 4, when one will be sent post free. Secretaries of Associations requiring a supply are advised to communicate with Mr. Rogers.

## New Flavourings in Ice-cream

Ice-cream is increasing in popularity every day, and will necessarily bring about a demand for a larger number of flavourings. At present we have only vanilla, strawberry, and raspberry flavourings, and to a lesser degree lemon, orange, and coffee. The thirst-quenching properties of lemons and oranges should make these flavourings for ice-cream very popular. A. Boake Roberts and Co., Ltd., are now engaged in making other fruit flavourings, including banana, cherry, lime, peach, pineapple, pistachio, maraschino, kummel, and crême de menthe. If these prove popular there will be a great increase in the ice-cream trade, and, further, there is ample opportunity to make compounded flavours. Only the finest selected ripe fruit is used, and, indeed, is absolutely indispensable for the production of extracts for imparting the flavour of the fresh fruit to the ice-cream. We have no doubt that a high standard of quality will be maintained by this firm, and there is every prospect of a great future for the ice-cream industry.

### Surprise Butter Inspections

The Depàrtment of Agriculture announce that on June 14 packages of butter from 213 creameries in Saorstat Eireann were forwarded to the Department's Butter Testing Station, Dublin, where they were retained and examined on June 27 and 28 by three judges acting independently. The marks awarded for flavour, texture, colour, and packing and finish have been communicated to each of the creameries from which exhibits were forwarded.

The continuous improvement in the quality and texture of the butter manufactured in Saorstat creameries may be deduced from the fact that all the exhibits were up to the standard fixed for creamery butter intended for export, and that 91 per cent. attained as high a standard as will eventually be required for the award of the National Mark.

* * *

The Visco Air Filter made by the Visco Engineering Co. deserves notice here. A very high efficiency is claimed for this filter, both for cleaning the air and for destroying bacteria in the air. It consists of two cells. The dust passing through the first is as little as 2 per cent., so that the air is rendered practically dust free. The filter, when required for destroying bacteria, is heavily copper-plated.

* * *

We have received a priced catalogue of machinery for various trades from Wm. R. Dell and Son, of Mark Lane. It includes Roller Mills for grinding Chocolate, Patent Foods, Coffee, and other articles of food; Mixers, Weighing Machines, and other articles.

* * *

Another air filter is the "Ventex," made by Sturtevant Engineering Co., Queen Victoria Street. This filter removes from the air soot, grease, or any other dirt. It is specially suitable in places where delicate scientific apparatus is stored.

* * *

Messrs. Lewenz and Wilkinson, Ltd., of 25, Victoria Street, S.W.1., have been appointed sole agents for Great Britain and Northern Ireland for Messrs. Keiser and Schmidt, Charlottenburg, for the sale of Pyrometers and Resistance Thermometers of all descriptions manufactured by that firm.

* * *

At Utrecht the Dutch Industries Fair International will be held from September 4 to 13, 1928. It will include the following industries: Dairy Machines and Dairy Implements, Foodstuffs and Luxuries. Further information can be obtained from the Secretaryship of the Fair, Utrecht (Holland).

## Enquiries

*The following are extracts from letters we have lately received. We shall be glad to put interested parties in touch with the writers, or to insert replies in the Correspondence columns.*

* * *

36. Wanted, a representative with practical experience of preserving to handle the sale of apple pectin.

* * *

37. Required, names of sugar boilers, who specialise in packing boiled sweets for export.

* * *

38. Wanted, the name of a firm who makes keys for opening sardine and meat tins.

*(Concluded from next page.)*

*Voluntary Liquidations.*

(Note.—Voluntary liquidations may, in some instances, refer to companies in course of reconstruction.)

BEDFORDSHIRE SUGAR CO., LTD. Resolved, June 9, that the company be wound up voluntarily, and that Mr. W. R. T. Whatmore, C.A. (Messrs. Peat, Marwick, Mitchell and Co.), 11, Ironmonger Lane, E.C.2., be appointed liquidator.

E. P. NORTON (BACON CURERS), LTD. (in voluntary liquidation). General Meeting of the Members of this company will be held at 9-11, Old Bank Buildings, Chester, on August 31, at 11 a.m., to hear the report of the liquidator showing how the winding-up has been conducted. Liquidator: Mr. W. H. Humphreys.

INTERNATIONAL DELICACIES, LTD. (in voluntary liquidation). General Meeting of the Members of this company will be held at the offices of the liquidator, Mr. Thos. Froude (Messrs. Oscar Berry, Froude and Co.), Chartered Accountants, Monument House, Monument Street, E.C.3, on August 15, at 3 p.m., to hear the liquidator's report showing how the winding-up has been conducted.

WINOX, LTD. General Meeting of the Members of this company will be held at the offices of Messrs. F. Anderson and Co., Ltd., Dominion Buildings, Richmond, Surrey, on August 14, at 12 noon, to hear the liquidator's report showing how the winding-up has been conducted. Liquidator: Mr. E. D. Basden.

ASSOCIATED ISINGLASS MANUFACTURERS, LTD. (in voluntary liquidation). General Meeting of the Members of this company will be held at 6, Devonshire Square, E.C.2., on August 13, at 12 noon, to hear the liquidators' report, showing how the winding-up has been conducted. Joint liquidators: Mr. R. S. Ford and Mr. F. J. Higgin.

# Commercial and Legal News

*(The Editor does not accept responsibility for any errors which may occur in the following notices.)*

## New Companies

P. BROWNE AND SONS, LIMITED. (231931) Regd. July 12, 1928. 23, Woodville Road, Leicester. To take over the bus. of a grocer and provn. mcht. cd. on at Leicester. Nom. Cap.: £1,000 in £1 shares.

H. SALVARELLI (AGENCIES), LIMITED. (231919) Regd. July 12, 1928. To carry on the bus. of produce mchts., packers, representatives, canners, and preservers of fruit, etc. Nom. Cap.: £1,500 in £1 shares.

METCALFE BROS. (GROCERS), LIMITED. (231878) Regd. July 10, 1928. 23, Bridge Street, Burnley. To take over the businesses of a grocer cd. on at Burnley, Padiham, Nelson, Todmorden, St. Annes-on-Sea, and Oldham, as "Metcalfe Bros." Nom. Cap.: £15,000 in £1 shares (8,000 pref. and 7,000 ord.).

MARSHALL VERREN, LIMITED. (231963) Regd. July 13, 1928. To take over the bus. of a family grocer and provn. mcht. cd. on at 57, Mill Street, Bideford, as "S. Blower." Nom. Cap.: £3,650 in £1 shares.

G. D. WINES, LIMITED. (231997) Regd. July 14, 1928. To carry on the bus. of brewers, vintners, malsters, and hop mchts., etc. Nom. Cap.: £3,000 in 1/- shares.

HARRY TOWLER, LIMITED. (231998) Regd. July 14, 1928. Station Yard, Haworth, nr. Keighley. To carry on the bus. of corn and flour millers, etc. Nom. Cap.: £1,000 in £1 shares.

OAK CAFÉS, LIMITED. (232005) Regd. July 14, 1928. To carry on the bus. of bakers, refreshment contractors, etc. Nom. Cap.: £100 in £1 shares.

VALE OF MOWBRAY PURVEYING COMPANY (1928), LIMITED. (231941) Regd. July 12, 1928. To take over the bus. of a purveyor, cattle and pig dlr., baker, confectioner, and grocer, etc., cd. on at Northallerton, Catterick, Middlesbrough, and elsewhere, by The Vale of Mowbray Purveying Co., Ltd. Nom. Cap.: £2,000 in £1 shares.

J. W. KILLINGBECK AND SON (YORK), LIMITED. (232001) Regd. July 14, 1928. 32, Townend Street, York. To carry on the bus. of butchers, etc. Nom. Cap.: £500 in £1 shares.

CHARLES DOWNING, LIMITED. (232069) Regd. July 18, 1928. 9, New Street, Cardiff. To carry on the bus. of dlrs. in potatoes and all kinds of vegetables and fruits, etc. Nom. Cap.: £1,000 in £1 shares.

GERTRUDE, LIMITED. (232111) Regd. July 19, 1928. 71, Banstead Road, Carshalton Beeches, Surrey. To carry on the bus. of wholesale and retail bakers and confectioners, etc. Nom. Cap.: £100 in 1/- shares.

WEST OF ENGLAND TEA COMPANY, LIMITED. (232130) Regd. July 19, 1928. 46, Market Street, Falmouth, Cornwall. To carry on the bus. indicated by the title. Nom. Cap. £500 in £1 shares.

SOMERSET EGG AND POULTRY COMPANY, LIMITED. (232127) Regd. July 19, 1928. To carry on the bus. indicated by the title. Nom. Cap.: £100 in £1 shares.

CLIFFORD AND COMPANY (BOGNOR), LIMITED. (232105) Regd. July 19, 1928. 8, York Road, Bognor, Sussex. To carry on the bus. of hotel proprs., caterers, bakers, etc. Nom. Cap.: £4,000 in £1 shares.

## Legal News

In the King's Bench Division on July 24, 1928, before Mr. Justice Roche, Messrs. Paul Lund and Co., Ltd., of Hill Street, Birmingham, were sued by the Aktie Trondhjem Canning and Export Co., of Trondhjem, Norway, tinned fish merchants, for damages for alleged breach of contract with reference to the non-acceptance of 6,000 cases of Sild, tinned in oil and tomato sauce, which, it was said, Messrs. Lund ordered.

Mr. R. A. Willis for the plaintiffs, said the contract between the parties was arrived at as a result of correspondence in October of last year and through Mr. B. N. Sexton, acting as broker between the parties. The fish were duly packed, but plaintiffs failed to inspect them, and subsequently repudiated the contract and refused to accept the cases. Plaintiffs contended that as they were unable to resell they were entitled to damages, and claimed £700.

The defence was a denial that there was an agreement to buy from the plaintiffs any of the cases of fish. The broker, Sexton, was the agent of the plaintiffs only and not the defendants. Alternatively, if there was a contract, the defendants had the right to reject the whole. Their agent inspected samples, and as they were not up to the standard required, the 6,000 cases were rejected.

After hearing the whole of the evidence on either side, Mr. Justice Roche held that there was no concluded bargain between the parties, although at first it looked as if there had been. Therefore, there would then be judgment for the defendants.

Judgment was entered accordingly for Messrs. Lund and Co., with costs.

## London Gazette Information

*Merchandise Marks Act*, 1926:

His Majesty in Council was pleased on July 13, 1928, to approve Orders in Council under the abovenamed Act, entitled the "Merchandise Marks (Imported Goods) No. 1 Order, 1928," the "Merchandise Marks (Imported Goods) No. 2 Order, 1928," and the "Merchandise Marks (Imported Goods) No. 3 Order, 1928."

Copies of the Orders, when published, will be obtainable at H.M. Stationery Offices.

*(Continued on previous page.)*

# Current Literature

## Fruit and Vegetable Products

56. Acidity in Fruit Juices and Preserves. C. F. Muttelet. (*Compt. Rend.*, 1928, 186, 1299-1301.)

57. Commercial Tomato Preserves. C. Ferri. (*Anal. Ofic. Quim. Prov., Buenos Aires*, 1927, 1, 141-191.)

58. An Unbiased Report on the Performance of Pfaudler Equipment in the Manufacture of Jams. A. C. Nielsen Company and J. W. Allen and Co. (*Fruit Prods. Jour.*, 1928, June, 9.)

59. Investigations of the Use of Fruits in Ice-Cream and Ices, IV. G. D. Turnbow and W. V. Cruess. (*Fruit Prods. Jour.*, 1928, June, 18.)

60. Organic Acids of Tomatoes. A. Borntraeger. (*Zeit. Unters. Lebensm.*, 1928, 55, 112-143.)

61. Intestinal Bacteria Isolated from Packed Dates. R. F. Hunwicke and G. N. Grinling. (*Lancet*, 214, 1071-1072.)

62. Heat Penetration as a Factor in Pasteurisation. M. A. Joslyn. (*Canning Age*, 1928, July, 629.)

63. The Effect on the Softening of Dill Pickles. B. E. Lesley and W. V. Cruess. (*Fruit Prods. Jour.*, 1928, June, 12.)

64. The Successful Cider Mill of To-day, II. H. F. Macmillin. (*Fruit Prods. Jour.*, 1928, June, 13.)

65. The Rôle of Viscosity in Heat Penetration—Heat Penetration in Sugar Solutions, II. M. A. Joslyn. (*Fruit Prods. Jour.*, 1928, June, 22.)

66. The Effect of Nitrates upon Corrosion in Tin Cans. C. W. Culpepper and H. H. Moon. (*Canning Age*, 1928, July, 619.)

## Cereal Products

67. Effect of Severe Weathering on Certain Properties of Wheat. W. O. Whitcomb and A. H. Johnson. (*Cereal Chem.*, 1928, 5, 117-128.)

68. Wheat and Flour Studies: XIV. Factors Influencing the Viscosity of Flour-Water Suspensions; III. Effect of small quantities of Carbon Dioxide in water used for the Extraction of Electrolytes. A. H. Johnson and B. L. Herrington. (*Cereal Chem.*, 1928, 5, 105-116.)

69. Proteoclastic Activity of Flour. A Cairns and C. H. Bailey. (*Cereal Chem.*, 1928, 5, 79-104.)

70. Chemistry of Bread. D. W. Kent-Jones. (*J. S. C. I.*, 1928, 47, 143-149T.)

71. Determination of Starch in Bread. P. Fleury and G. Boyeldieu. (*Ann. Falsif.*, 1928, 21, 124-130.)

72. Adsorption Phenomena [with wheat]. G. Testoni. (*Rev. gén., Colloïd.*, 1928, 6, 8-15.)

73. Determination of Dextrose in presence of Proteins [in Gluten Bread]. P. Fleury and G. Boyeldieu. (*Bull. Soc. Chim. Biol.*, 1928, 10, 568-575.)

74. Better Methods of Canning Crops Production: Sweet Corn Experiments. C. B. Sayre. (*Canner*, 1928, June 30, 29.)

75. Determination of Corn Cockle in Flour by Hæmolysis. F. S. Okoloff. (*Zeit. Unters. Lebensm.*, 1928, 55, 155-162.)

## Dairy Products

76. Action of Cold on the Fat of Milk. G. Quagliariello. (*Atti. R. Accad. Lincei*, 1928, [vi], 7, 75-78.)

77. Phosphorus Compounds of Milk: IV. Presence of Adenine Nucleotide in Milk. H. D. Kay and P. G. Marshall. (*Biochem. J.*, 1928, 22, 416-418.)

78. Effect of Alkali Solutions on Bacteria found in Unwashed Milk Bottles. C. S. Mudge and B. M. Lawler. (*Ind. Eng. Chem.*, 1928, 20, 378-380.)

## Various

79. Grading of Commercial Gelatin and its Uses in the Manufacture of Ice-Cream, II. A. C. Dahlberg, D. C. Carpenter, and J. C. Hening. (*Ind. Eng. Chem.*, 1928, 20, 516-526.)

80. Changes produced in Meat Extracts by the Bacterium Staphylococcus Aureus. Application of the Alcohol Vitration Methods. F. W. Foreman and G. S. G. Smith. (*Dept. Sci. Ind. Res., Food Invest.*, 1928, *Special Report* No. 31, 97 pp.)

81. Can Seam Cross Sections and the Distribution of Compound. D. M. Stevens. (*Canning Age*, 1928, July, 609.)

82. Canned Foods and Public Health. C. R. Fellers. (*Canning Age*, 1928, July, 612.)

83. The Function of Vacuum in Canned Foods. R. D. Clough. (*Canning Age*, 1928, July, 614.)

84. Comparative Tests on Taped and Silicated Fibre Boxes for Canned Foods. (*Canner*, 1928, June 30, 17.)

85. Aids to Management of Canning Companies through Accurate Accounting and Cost Information. G. V. Rountree. (*Canner*, 1928, June 30, 23.)

86. Honey Diastase. J. Fiehe and W. Kordatzki. (*Zeit. Unters. Lebensm.*, 1928, 55, 162-169.)

87. The Aldehyde Oxidase of the Potato. F. Bernheim. (*Biochem. J.*, 1928, 22, 344-352.)

88. The Vitamin B Content of Malt Extract. A. L. Bacharach and E. Allchorne. (*Biochem. J.*, 1928, 22, 313-316.)

## Analysis

89. Composition of the Fatty Acids of Palm Oil. A. Rayner and S. G. Campbell. (*J. Soc. Chem. Ind.*, 1928, 47, 149T-150T.)

(*Continued on next page.*)

# Recent Patents

*These particulars of New Patents of interest to readers have been selected from the "Official Journal of Patents," and are published by permission of the Controller of H.M. Stationery Office.*

## Latest Patent Applications

19384. BATEMAN, C. S.: Treatment of tea. July 4.

19136. COMPAGNIE OLOVIER AND MICHAUD, M.D.C.: Preservation of eggs, etc. July 2.

19097. FANCETT, T.: Preparation of confectionery. July 2.

19147. KORSELT, J.: Manufacture of juices from plants. July 2.

19860. LANGFELDT, E.: Production of sugar solution. July 7.

## Specifications Published

293,066. FARNELL, R. G. W.: Extraction of sugar from beet.

*Printed copies of the full Published Specifications may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2, at the uniform price of* 1s. *each.*

## Abstracts Published

287,185. **Stoppers.** BENNETT, G. H. Sept. 17, 1926.

*Vacuum closures.*—In a vacuum closure for jars, bottles, etc., for containing and preserving foods or other substances, an opening is formed in the skirt of the closure cap or cover and the jointing ring is formed with a tab which projects through the opening for use in breaking the vacuum. The top of the cap is recessed or dished to accommodate the jointing ring. The closure cap may be of the screw-threaded or part-turn type.

287,605. **Pasteurising liquids.** HIPWELL, F. C., AND AUSTIN, W. B. Nov. 29, 1926.

Apparatus for pasteurising beer and other liquids in bottles or other containers, comprises a horizontal tank containing a heating liquid in which the bottles are submerged. The bottles are carried by a horizontal endless conveyer through the lower compartment of the tank, the liquid in which is heated—*e.g.*, by steam coils—so as to give a graduated temperature therein to heat the bottles gradually to the pasteurising temperature. The bottles are then carried by the conveyer through the upper compartment, the liquid in which is kept at pasteurising temperature—*e.g.*, by a steam coil.

289,289. **Food for poultry.** BERTELS, B. H. July 11, 1927.

A food in granular form for poultry is manufactured by mixing together finely ground kinds of grain, ordinary meal, and animal meal, partially expressed oil containing seeds, food salts, and constituents containing vitamins, such as cod liver oil and dried yeast, the mixture then being pressed in a dry state into granules of the required size. The grain may be wheat, yellow maize, rice, oats, buck-wheat, and barley. The oil containing seeds may be linseed, sunflower seeds, and ground nuts, these being expressed to contain about 10 per cent. of oil. As examples of ordinary meals, semolina, rice meal, tapioca meal are given, and meat meal is mentioned as a meal of animal origin.

289,295. **Depericarping and drying palm oil nuts, etc.** JACKSON, L. MELLERSH-. July 18, 1927.

289,341. **Bottle closures.** SALIN, A. Oct. 11, 1927.

*Capsules.*—A bottle capsule for use with a stopper having one or more lateral protuberances is provided with one or more apertures in its wall to accommodate the protuberances.

289,688. **Making artificial skins for sausages.** SAMUEL, J., LIPMAN, C., AND GÄTJENS, B. Aug. 30, 1927.

*Extrusion apparatus.*—Artificial sausage skins are made from an emulsion of animal matter which, after introduction into the space between a container and a conical insert, passes down the narrow channel to a vertically descending delivery tube, whereon a tubular film is deposited, the thickness of the film

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(*Continued from previous page.*)

90. The Kreis Test for Rancidity. W. G. Powick. (*Oil and Fat Ind.*, 1928, 5, 107-108.)

91. Chemical Composition of Ergot Oil. W. F. Baughman and G. S. Jamieson. (*Oil and Fat Ind.*, 1928, 5, 85-89.)

92. Cacao Tannin and its Determination. H. R. Jensen. (*Analyst*, 1928, July, 365.)

93. Fluorescence of Italian Olive Oils in Ultra-violet Light. R. Stratta and A. Mangini. (*Giorn. Chim. Ind. Appl.*, 1928, 10, 205-207.)

94. Determination of the Colour-Producing Constituents of the Cacao Bean. W. B. Adam. (*Analyst*, 1928, July, 369.)

being determined by scraping projections within the depending portion of the container. The delivery tube, carrying the film or skin, finally leaves the machine at the bottom and is transferred to a drying chamber, and the skin is then removed.

289,978. **Breadmaking; ferments.** BRITISH ARKADY CO., LTD., WHYMPER, R., AND HEWITT, H. Feb. 12, 1927.

In a bread-making process a ferment for subsequent incorporation into the dough, flour or other dough ingredient is separately prepared and comprises a mixture of yeast and an enzyme-producing fungus, such as Aspergillus Oryzeæ or Penicillium. Yeast cultivated on a dough made from wheat, maize, rice, or like flour may be incorporated with Aspergillus Oryzeæ, or Aspergillus cultivated on rice, barley, etc., may be added to yeast, or the product resulting from the growth of both fungi may be mixed, or both types of fungi may be grown on a starchy dough with or without the addition of wheat germ or soya bean meal and mineral salts. The ferment product is dried and ground, or it may be forced through vermicelli dies, dried and ground and mixed with the powdered product of Aspergillus cultivated on rice or rice and wheat germ. Two examples of the preparation of the ferment are given.

290,847. **Glucose, etc.** CORN PRODUCTS REFINING CO., 17, Battery Place, New York, U.S.A.

In dextrose solutions, produced by the acid hydrolysis of starch, the polysaccharides are reconverted by hydrolysis in the absence of the polymerising metal salts, etc. The process is also applicable to mother liquor from crystallisation, melts, and mixtures. In the application to centrifuged mother liquor, the solution is neutralised and filtered, and may be treated with an adsorption agent. The liquor is then hydrolysed in a converter, having inner walls inert to the acid, for example, in a glass, enamel lined vessel, and in the presence of adsorption agents.

290,292. **Preserving fish, etc.** HANSEN, D. A., Andenes, Norway.

Fish—*e.g.*, herrings or stockfish, or livers, roes or other parts of fish—are preserved by treatment with a solution containing borax, and an equal, or preferably smaller amount of an acid preservative substance, such as boric acid, or other suitable boron compound, or salicylic acid. The solution may be made in fresh or sea water, and may be applied by brushing, dipping, or immersing the fish. The preservatives are removed from sale or use by washing with fresh or sea water. The fish may be stored in the solution. Examples are given in the Specification.

290,265. **Sugar; treating scums.** RAFFINERIE TIRLEMONOISE SOC., Anon, Tirlemont, Belgium.

Scums of all kinds, but especially the saturation scum, lime, baryta, strontia, and other saccharate scums occurring in sugar treatment, are centrifuged to separate them from the sugar juice, etc., the centrifugal force being increased so far that the scum remaining in the centrifuge contains only about 15-20 per cent. of water, juice, or liquor. The centrifugal force required is 1500-6000 times or more the weight of the substance treated.

290,195. **Food preparations; vitamins.** JAEGER, C., Sanatorium Universitaire, Leysin, Switzerland.

A substitute rich in vitamins is produced by exposing dried bananas, preferably in meal condition and in thin layers, to the action of ultra-violet rays.

289,722. **Conditioning dried fruits.** SUN-MAID RAISIN GROWERS OF CALIFORNIA, Holland Building, Fresno, California, U.S.A.

For improving dried fruits, particularly raisins; they are treated with steam and ozone, or ozonised air, and then, protected from the air; they are quickly dried, preferably on a shaking heated metal grill at about 750° F., and vapours are exhausted from the drying chamber. Opposed blasts of steam at about 285° F., and highly concentrated ozone, may be arranged to mingle amongst falling raisins, which, by the provision in the shoot of oppositely slanting louvres, or shelves, are caused to turn over and over during their descent; during the first part of the fall the steam should preponderate, and during the last part the ozone should be in excess.

## Recent Trade Marks

*This list of Trade Marks of interest to readers has been selected from the "Official Trade Marks Journal," and is published by permission of the Controller of H.M. Stationery Office.*

### RASPETTE

491,468. **Biscuits and cakes.** MCVITIE AND PRICE, LIMITED, St. Andrew Biscuit Works, Gorgie Road, Edinburgh; and The Edinburgh Biscuit Works, Harlesden, London, N.W.10. July 11.

### BOOMERANG

491,947. **Flour.** ANDREW TAYLOR, trading as ANDREW TAYLOR AND CO., 163, Hope Street, Glasgow. July 11.

### POLSINE

489,633. **Spices, herbs, and condiments for flavouring purposes for use as ingredients in food.** JOHN CRAMPTON AND COMPANY, LIMITED, 31 and 33, Princess Street, Chester Road, Manchester. July 4.

### CHESDALE

486,259. **Cheese.** N. Z. CHEESE, LIMITED, 70, Queen Street, Auckland, New Zealand. July 4.